MANUAL TRANSMISSION AND CLUTCH 16

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GENERAL DESCRIPTION

All TRANSIT models are fitted with four-gear transmission with full synchromesh. Models are equipped with one of two different gearbox types. To simplify identification of these gearboxes in the Workshop Manual, they are given the letters 'F' and 'G' respectively.

The 'Gearbox Usage Table' given overleaf indicates which vehicles are fitted with the gearbox variants.

'F' Gearbox

In this gearbox the 1st/2nd gear synchroniser hub is pressed onto the mainshaft and forms a unit with it (also see Fig. 33 on page 21), the end float being controlled by selective circlips.

In addition to the standard 'F' gearbox, Fig. 1, an uprated version can be installed. This depends upon vehicle model, type and the engine fitted.

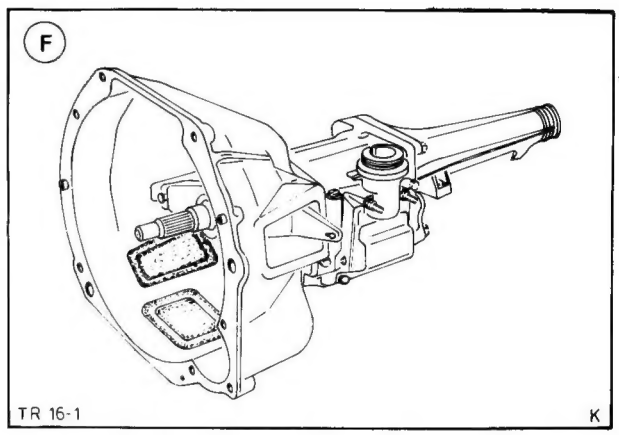


Fig. 1. 'F' gearbox

'G' Gearbox

The 'G' gearbox, Fig. 2, is a heavy duty unit.

Here the mainshaft ball bearing race is seated in a bearing block. Like the 'F' gearbox, this unit has a bolt-on clutch housing. In both variants the clutch release lever and thrust bearing have to be removed with the clutch housing. Only then, after removing a spring washer, can the release lever and thrust bearing be detached.

Depending on the version, the 'G' gearbox is fitted with one of two different extension housings (also see Fig. 64 on page 32).

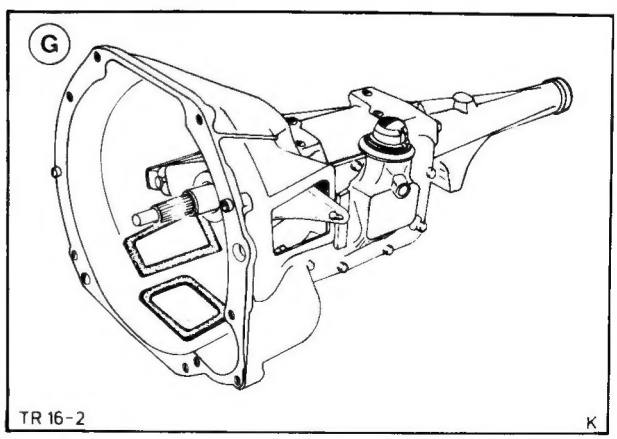


Fig. 2. 'G' gearbox

GEARBOX USAGE TABLE

Vehicle Type	Gearbox	Engine	Vehicle Version
FT 80	F or G	1,6 l Kent (OHV) 1,6 l LC (OHC)	Van, Kombi
FT 100	F* or G	1,6 l Kent (OHV) 1,6 l LC (OHC) 2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab Platform/chassis+dual cab
FT 100 L	F* or G	2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab
FT 120	F* or G	1,6 l LC (OHC) 2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab Platform/chassis+dual cab
FT 130	F* or G	2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab Platform/chassis+dual cab
FT 130 B	G	2,0 l LC (OHC)	Kombi
FT 160	F* or G	2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab
	F* or G	2,0 l LC (OHC) 2,4 l Diesel (OHV)	Van Kombi Platform/chassis+single cab Platform/chassis+dual cab
FT 190	F* or G	1,6 l LC (OHC) 2,0 l LC (OHC) 2,4 l Diesel (OHV)	Bus – 9 seater
	F* or G	1,6 l LC (OHC) 2,0 l LC (OHC) 2,4 l Diesel (OHV)	Bus – 12 seater
FT 130	G	2,0 l LC (OHC) 2,4 l Diesel (OHV)	Bus – 15 seater

*Uprated F gearbox can be fitted as option

NOTE: The individual gearbox variants are subject to vehicle version, type and the engine fitted.

CLUTCH

The clutch mechanism consists of a single-plate dry clutch with a diaphragm-spring pressure plate bolted to the flywheel. The clutch is operated by means of a cable (see Principle of Operation) and the release lever with the thrust bearing located in the clutch housing.

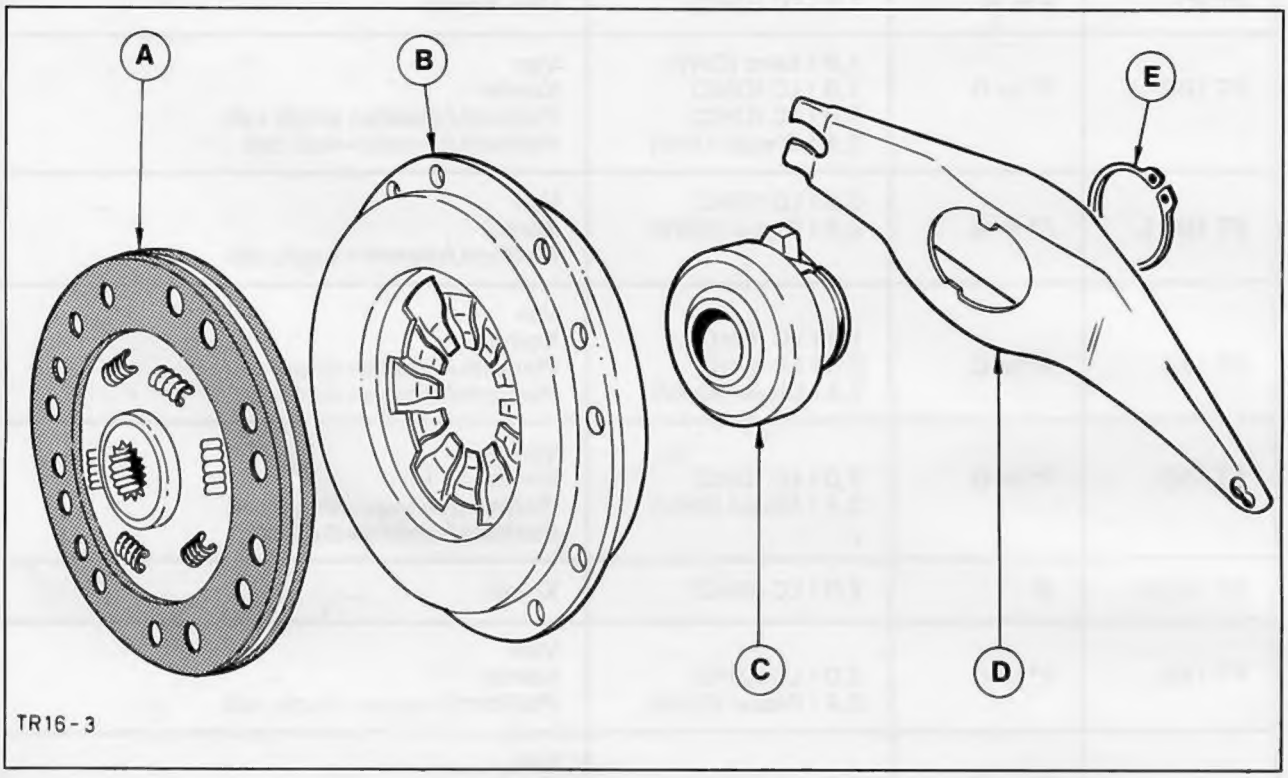


Fig. 3. A – Clutch disc
B – Pressure plate
C – Thrust bearing with guide hub
D – Release lever
E – Circlip

PRINCIPLE OF OPERATION

Gearbox

The engine torque is transmitted via the clutch and gearbox to the rear axle when a gear is selected. The matched ratios allow adaptation to varying road conditions, e.g. up or down gradients, or acceleration.

The helically cut forward gears on the mainshaft are in constant mesh with the corresponding countershaft gears, with the first small gear on the input shaft engaging in the largest countershaft gear.

The forward gears are selected with the aid of synchroniser hubs and synchroniser rings. When selecting the next higher gear, the higher gear on the mainshaft rotates faster than the synchroniser hub.

After disengaging the clutch and moving the gear lever to select a gear, the selector ring of the synchroniser hub is pushed towards the gear selected. The selector ring pushes the synchroniser ring onto the gear cone with the blocker bars.

The speed of the faster turning gear is reduced by the friction cone of the ring to that of the mainshaft, enabling gears to be selected.

The reverse gear on the countershaft is straight cut and drives the 1st and 2nd sliding gear on the mainshaft via the engaged idler gear.

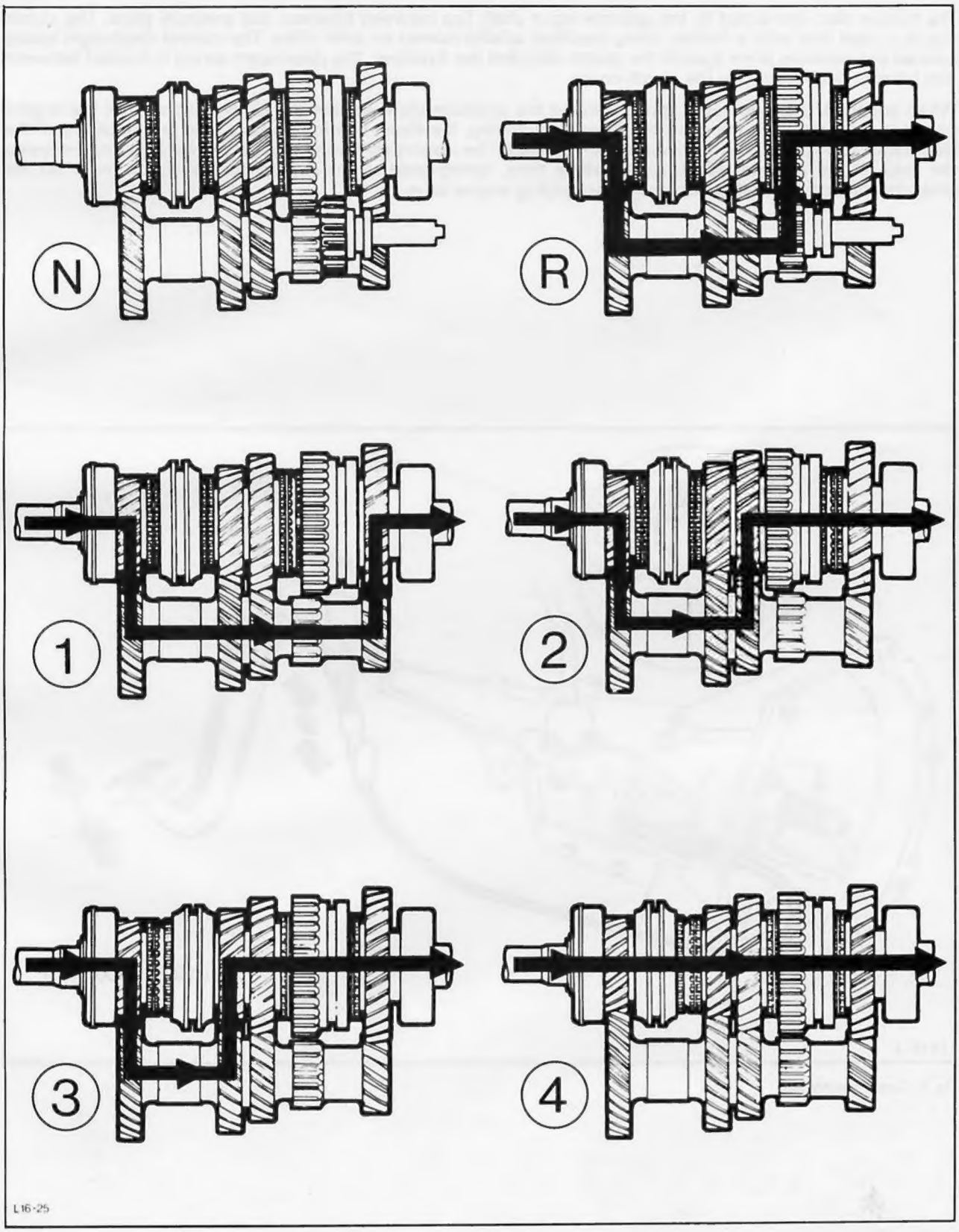


Fig. 4. Power flow

Clutch

The friction disc connected to the gearbox input shaft lies between flywheel and pressure plate. The clutch disc is a steel disc with a friction lining (resilient axially) riveted on both sides. The central diaphragm spring presses the pressure plate against the clutch disc and the flywheel. The diaphragm spring is located between two fulcrum rings riveted to the clutch cover.

When engaged, the diaphragm spring presses the pressure plate against the clutch disc so that the engine torque is transmitted to the gearbox. When declutching, the thrust bearing exerts a load on the centre of the diaphragm spring, pressing it towards the flywheel. The diaphragm spring tilts on the fulcrum ring, relieving the load on the pressure plate. At the same time, spring-steel straps riveted on the clutch cover lift the pressure plate off the clutch disc, thus disengaging engine drive.

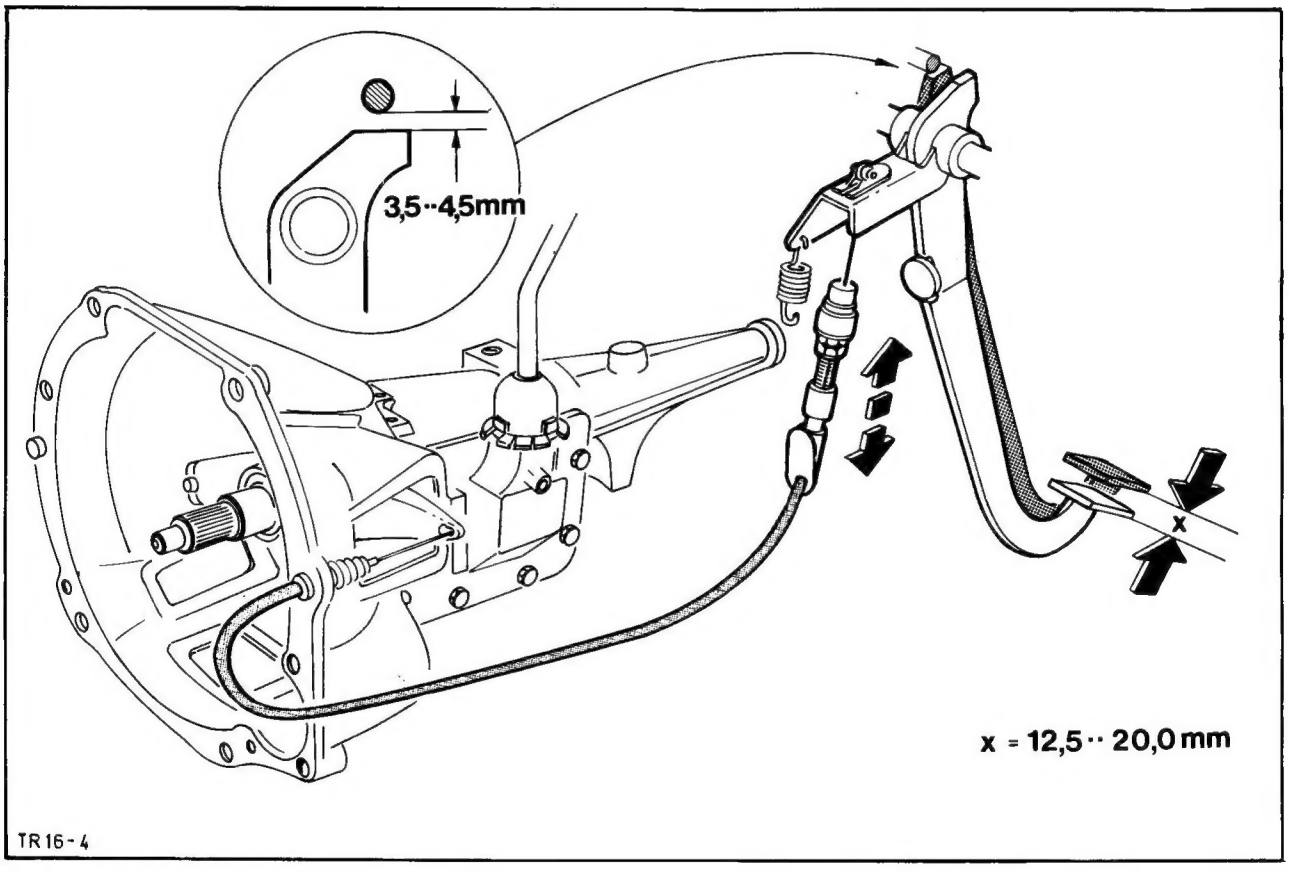


Fig. 5. Clutch mechanism

FAULT DIAGNOSIS – GEARBOX

Fault	*Cause*	*Remedy*
Jumping out of gear – forward gears	Coupling teeth on gear, or selector ring worn or faulty.	Replace gear and selector ring.
	Axial play in mainshaft, mainshaft bearing or abutment face damaged or worn.	Fit new mainshaft bearing or new gearbox extension housing. NOTE: Check circlip thickness first so mainshaft has no axial play when fitted; see operation 16 118 8 – for F gearbox only. In G gearbox – fit new mainshaft bearing.
	Mainshaft nut lock-washer faulty (G gearbox only).	Replace lock-washer, torque nut as specified and lock.
	Selector housing bolts loose.	Torque bolts as specified and bend washer tab over at 90° to inner teeth.
	Mainshaft damaged or inaccurately machined.	Replace mainshaft complete.
	Selector ring of synchroniser hub sticking.	If selector ring and hub are damaged, replace synchroniser ring as well. NOTE: In F gearbox synchroniser hub and mainshaft for 1st and 2nd gear form a unit so replace mainshaft complete if necessary.
	Insufficient spring loading in gear interlock (ball and plunger).	Replace interlock springs – with balls as well if necessary.
	Wear in selector forks.	Fit new selector forks.
Jumping out of gear – reverse gear	Worn teeth on reverse gear idler wheel.	Replace reverse gear idler wheel.
	Bush of reverse gear idler wheel worn or incorrectly inserted.	Replace reverse gear idler wheel, changing spindle as well if damaged.
Gears jamming	Selector housing bolts loose.	Torque bolts as specified and lock.
	Selector forks not engaging completely in selector ring.	Check both parts and bring into engagement, fitting new parts as necessary. Check fork retaining pin has not dropped out or been damaged – if so replace.
	Locking pins worn.	Fit new locking pins.
Noises when selecting gear	Synchroniser ring or synchroniser ring teeth worn.	Replace both parts, changing associated selector ring or gear with cone as well if necessary.
	Synchroniser springs faulty or fitted incorrectly.	Fit synchroniser springs correctly or replace.
	Blocker bars worn or damaged.	Replace blocker bars.
Stiffness when selecting gear	See under 'Jumping out of Gear' and 'Noises when selecting gear'.	

Noises are inevitable in new gearboxes or when new gears are fitted, so a new gearbox should not be stripped if at all possible during running in.

Also check before seeking faults in the gearbox itself that the fault in question is not to be found in the clutch.

NOTE: The advice given here is only intended as a guide to faster fault-diagnosis. It is always advisable to have fault-finding carried out by someone with sufficient experience, able to diagnose the causes of noises quickly and accurately.

FAULT DIAGNOSIS – CLUTCH

Fault	*Cause*	*Remedy*
Clutch slipping	Clutch pedal play incorrectly adjusted.	Adjust to specification.
	Linings of clutch disc smeared with oil or grease residues.	Fit new oil seal to guide sleeve if leaking, then fit new clutch disc.
	Clutch lining worn.	Replace clutch disc.
	Contact pressure of pressure plate too low.	Fit new diaphragm spring or replace pressure plate complete.
	Clutch has overheated.	Replace clutch complete.
Clutch snatching	Engine or gearbox mounting faulty.	Repair or replace as necessary.
	Clutch lining dirty or glazed	Clean clutch disc or replace as necessary.
	Pressure plate or release lever pressing on one side.	Check diaphragm spring and if necessary replace pressure plate complete. Check release lever and thrust bearing function correctly when fitted. Replace both parts if necessary.
	Clutch disc torsion springs faulty.	Replace clutch disc.
Clutch noisy	Thrust bearing faulty.	Replace thrust bearing.
	Torsion spring faulty.	Replace clutch disc.
	Diaphragm spring faulty.	Replace pressure plate complete.
	Pilot bearing or bush of gearbox input shaft faulty.	Replace pilot bearing or bush.

SERVICE CHECKS AND ADJUSTMENTS

Gearbox

The oil level in the gearbox should only be checked with the vehicle standing on level ground, having allowed sufficient time for the oil to cool since the gearbox oil tends to warm up and foam when the vehicle has been running. When the level is correct, the oil comes up to the lower edge of the filler opening, Fig. 6. If this is not the case, top up with oil of the stipulated specification (see Technical Data). A shortage of oil in the gearbox can only arise if there is a leak.

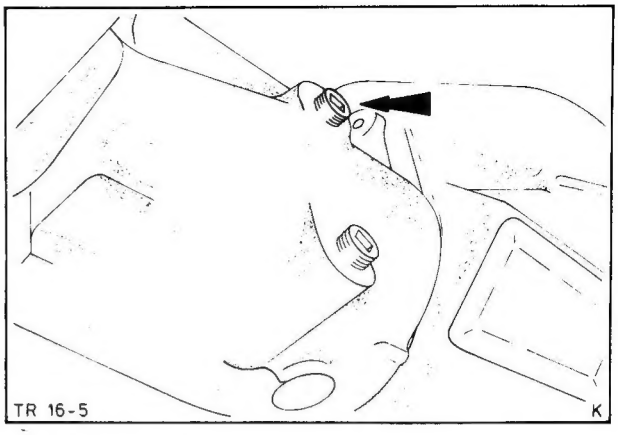


Fig. 6. Check oil level

Clutch

Smooth gear-changes and complete transmission of the engine torque to gearbox and rear axle are only ensured if the clutch is correctly adjusted.

The clutch play is measured at the pedal, and is adjusted, where necessary, as follows, Fig. 7.

Slacken lock nut and adjusting nut and turn adjusting nut until clutch pedal can be raised by amount 'X' then tighten lock nut and depress clutch pedal fully several times. Check clutch play again and repeat adjustment operation if necessary.

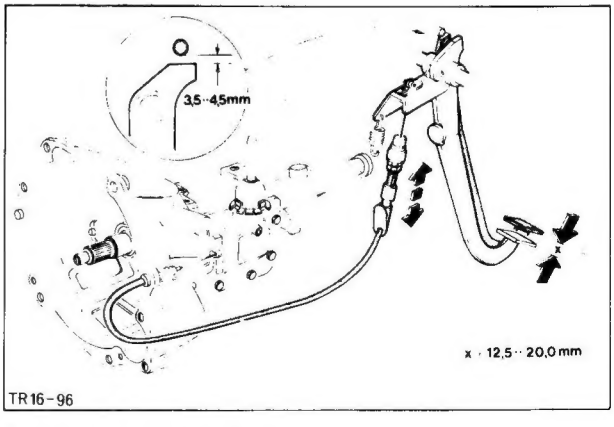
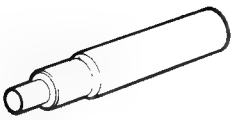


Fig. 7. Clutch play adjustment

SPECIAL SERVICE TOOL RECOGNITION

Tool			Tool Name
	16-003	G	Dummy countershaft
	16-009	F G	Gearbox mounting bracket
	16-011	G	Gearbox extension housing bush remover
	16-015	F	Installer for gearbox extension housing bush and oil seal
	16-016	G	Installer for gearbox extension housing bush and oil seal
	16-025	F	Gearbox extension housing bush remover
	16-027	G	Mainshaft nut wrench
	17-001	F G	Gearbox extension housing oil seal remover
	21-036	A B G	Flywheel bearing remover
	21-044	B G	Clutch plate installer/aligner

SPECIAL SERVICE TOOL RECOGNITION (cont'd)

Tool		Tool Name
	21–080A	Clutch plate locator and flywheel bearing replacer

SERVICE AND REPAIR OPERATIONS – CONTENT

Manual Transmission and Clutch 'F' gearbox 'G' gearbox			Described		Contained in operation	Also applicable to the models below				
						Fiesta	Escort	Capri	Taunus/ Cortina	Granada
Gearbox			F	G						
16 114		Transmission assembly – remove and install	X	X	—	—	—	—	—	—
16 118 8		Transmission assembly – overhaul	X	X	—	—	—	—	—	—
16 134 5		Pilot bearing – remove and install	X	X	—	—	X	X	X	X
16 144 4		Seal – input shaft – replace	—	—	16 118 8	—	—	—	—	—
16 146 5		Bearing – input shaft – replace	—	—	16 118 8	—	—	—	—	—
16 154 4		Bearing – main shaft – replace	—	—	16 118 8	—	—	—	—	—
16 162 4		Extension housing – remove and install	—	—	16 118 8	—	—	—	—	—
16 164		Bush – extension housing – replace	X	X	—	—	X	X	X	X
16 166 4		Seal – extension housing – replace	—	—	16 164	—	—	—	—	—
16 172		Gear – speedometer driven – remove and install	X	X	—	—	—	—	—	—
16 202 4		Synchroniser rings – replace	—	—	16 118 8	—	—	—	—	—
16 264 8		Selector housing – overhaul	X	X	—	—	—	—	—	—
16 284 4		Selector mechanism – remove and install	—	—	16 264 8	—	—	—	—	—
16 524		Gear lever – remove and install	X	X	—	—	—	—	—	—
Clutch										
16 724 4		Clutch disc and pressure plate – remove and install	X	X	—	X	X	X	X	X
16 756 4		Linings – clutch disc – replace	X	X	—	X	X	X	X	X
16 784 4		Clutch housing – remove and install	—	—	16 118 8	—	—	—	—	—
16 812		Clutch pedal – remove and install	X	X	—	—	—	—	—	—
16 813		Bushes – clutch pedal – replace	—	—	16 812	—	—	—	—	—
16 814		Cable – clutch operating – remove and install	X	X	—	—	—	—	—	—

16 114 TRANSMISSION ASSEMBLY – REMOVE AND INSTALL

Special Service Tools Required: None

To Remove

1. Drive vehicle over a pit or onto ramp, open hood, fit wing covers. Disconnect earth strap from battery.
2. Slacken clutch cable at pedal bracket, Fig. 8. Disconnect reversing lamp switch (where fitted) and disconnect gearbox earth strap. Loosen oil filler plug.

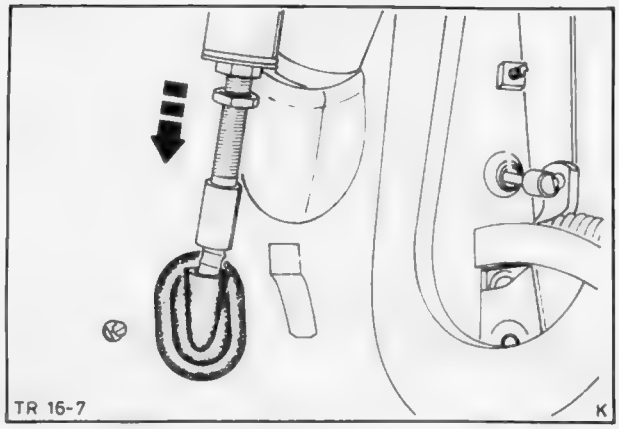


Fig. 8. Clutch cable slackened at pedal bracket

3. Pull off release lever gaiter. Detach clutch cable from release lever, pulling cable downwards by hand in front of the release lever, holding it with pliers and disconnecting cable end, Fig. 9.

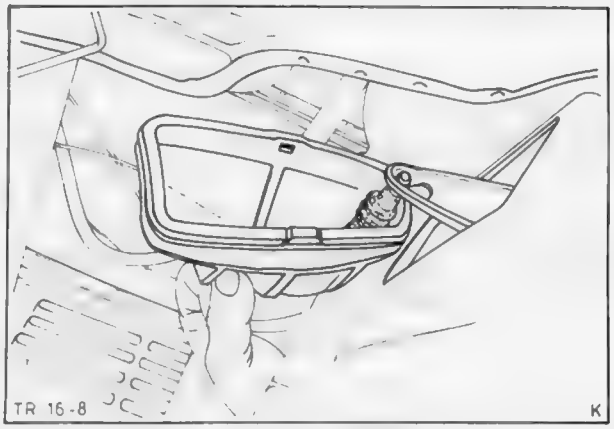


Fig. 9. Disconnect clutch cable from release lever

4. Remove gear lever from underneath, Fig. 10.
5. Disconnect starter motor lead.
6. Remove starter motor (3 bolts).
7. Detach speedometer cable from drive.
8. Detach clutch housing cover (2 bolts).

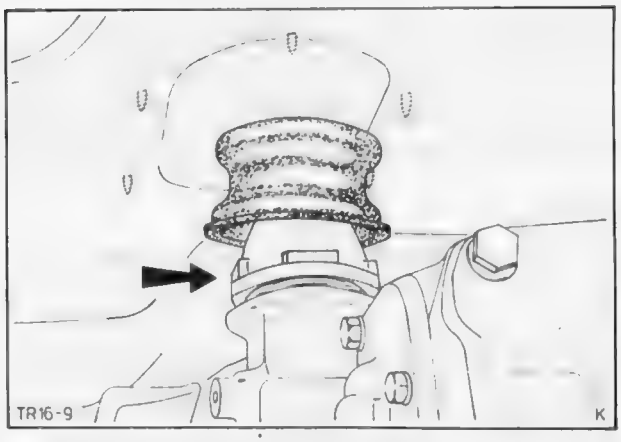


Fig. 10. Remove gear lever from underneath

9. Unbolt driveshaft from drive flange and floor pan centre bearing (6 bolts), Fig. 11. Draw shaft complete out of gearbox extension housing.

   To ensure no oil escapes, slide an old drive shaft stub or mainshaft cap into extension housing.

10. Detach gearbox cross-member complete from floor pan and gearbox (5 bolts).

    NOTE: Support gearbox.

11. Remove flange bolts (5) securing engine to gearbox.

12. Lift out gearbox carefully.

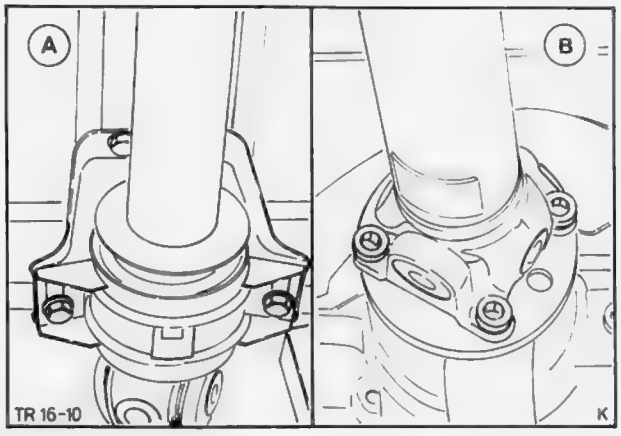


Fig. 11. Driveshaft mounting – rear axle flange and centre bearing
A – Centre bearing
B – Rear axle flange

To Install

13. Lightly grease gearbox input shaft and fit gearbox.

14. Locate clutch housing with two opposing bolts done up finger tight. Then insert remaining bolts. Torque all bolts as specified, Fig. 12.

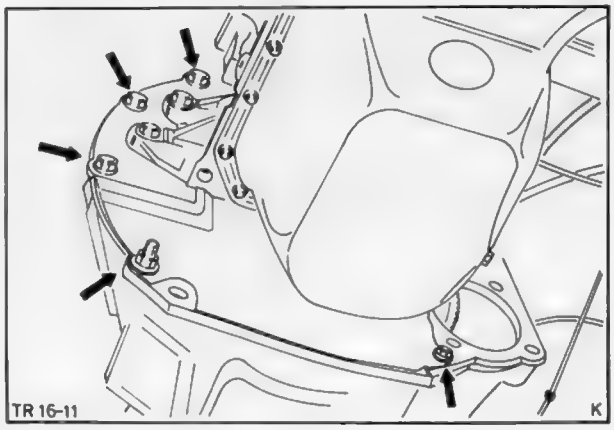


Fig. 12. Fit gearbox to engine flange

15. Attach gearbox cross member to gearbox and floor pan and tighten bolts to specified torque, Fig. 13.

16. Remove plug from extension housing and refit driveshaft complete. Loosely locate centre bearing with shims on floor pan. Connect driveshaft to rear axle flange and tighten bolts to specified torque. Then secure centre bearing so as to be parallel with the driveshaft and free of stress, tightening bolts to specified torque.

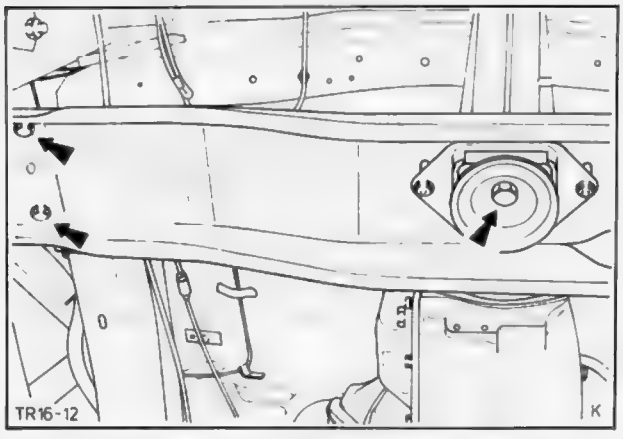


Fig. 13. Gearbox cross-member secured to floor pan

16 114 (cont'd)

17. Refit clutch housing cover.
18. Attach speedometer cable.
19. Fit starter motor.
20. Connect starter motor lead.
21. Fit gear lever, Fig. 14.

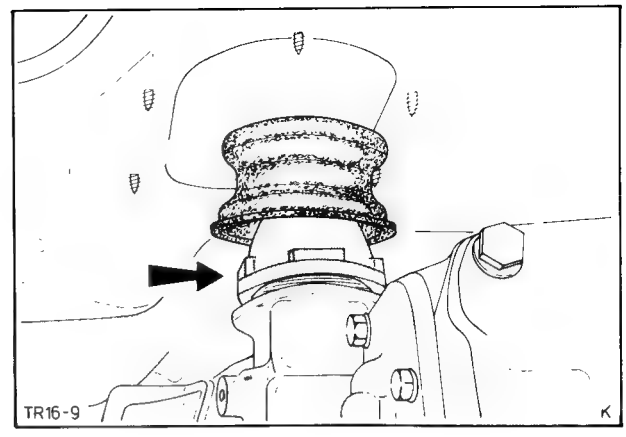


Fig. 14. Fit gear lever

22. Attach clutch cable to release lever. To do this, pass clutch cable through guide in the clutch housing and slip on gaiter. Draw the cable out of its sheath, hold with pliers and connect to release lever. Fit gaiter in place, Fig. 15.

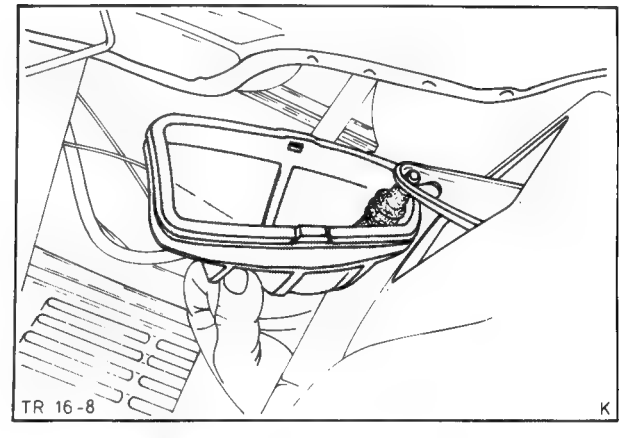


Fig. 15. Attach clutch cable to release lever

23. Adjust clutch pedal play, Fig. 16.
24. Check gearbox oil level and top up if necessary.
25. Connect battery earth strap, reversing lamp switch (where fitted) and gearbox earth strap. Close hood and remove wing covers.

NOTE: Depending on the variant, either the EARTH terminal only, or the EARTH terminal and LIVE cable support brackets are retained by the gearbox flange bolts.

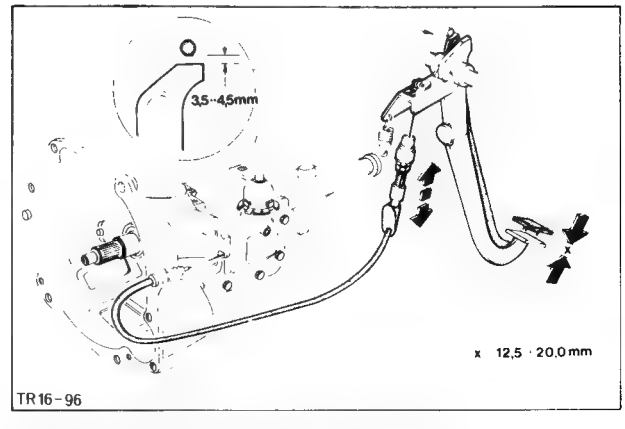


Fig. 16. Adjusting clutch play Pedal movement

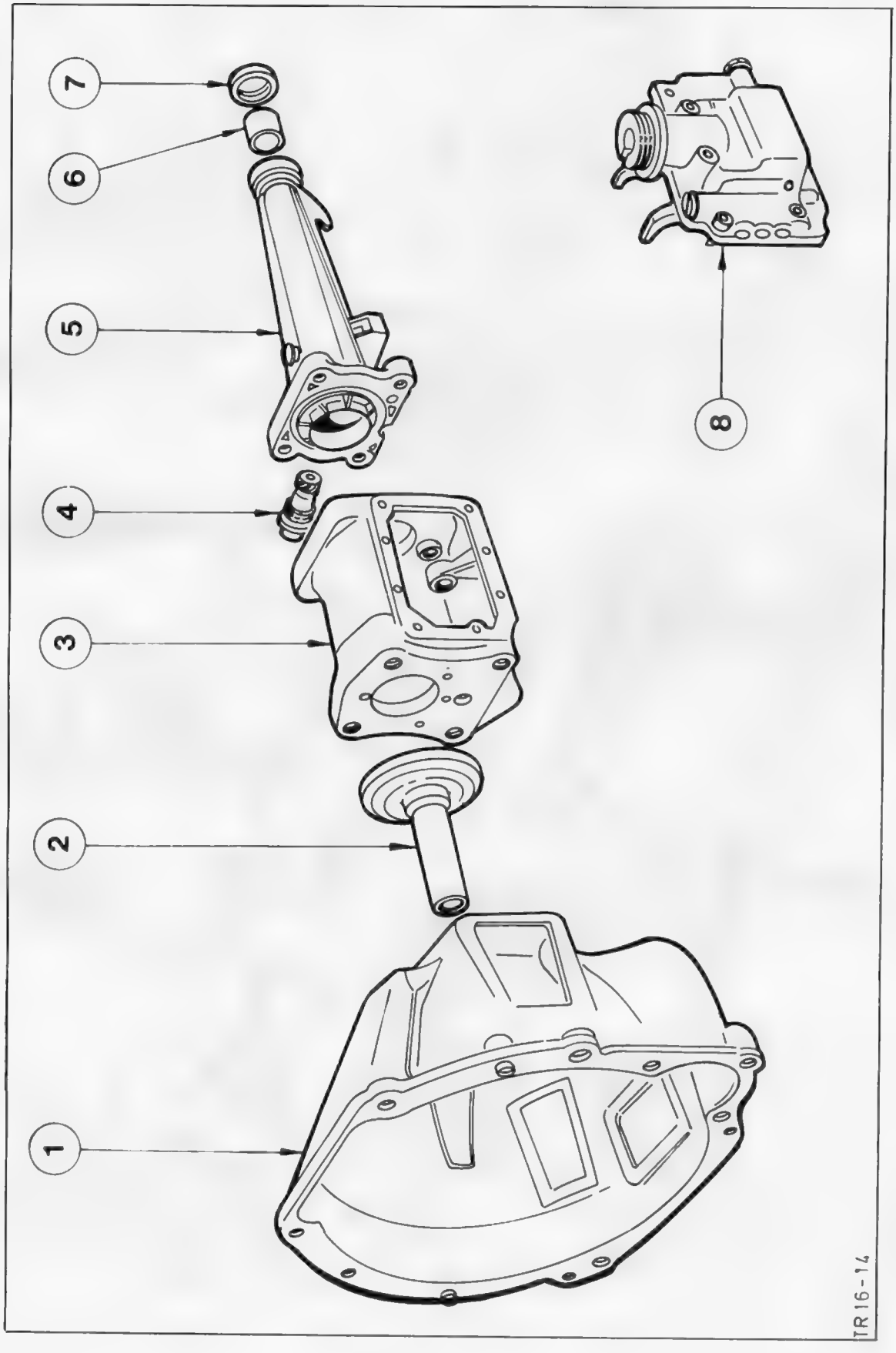


Fig. 17.

1. Clutch housing
2. Guide sleeve
3. Gearbox casing
4. Speedometer drive pinion
5. Gearbox extension housing
6. Extension housing bush
7. Oil seal
8. Selector housing

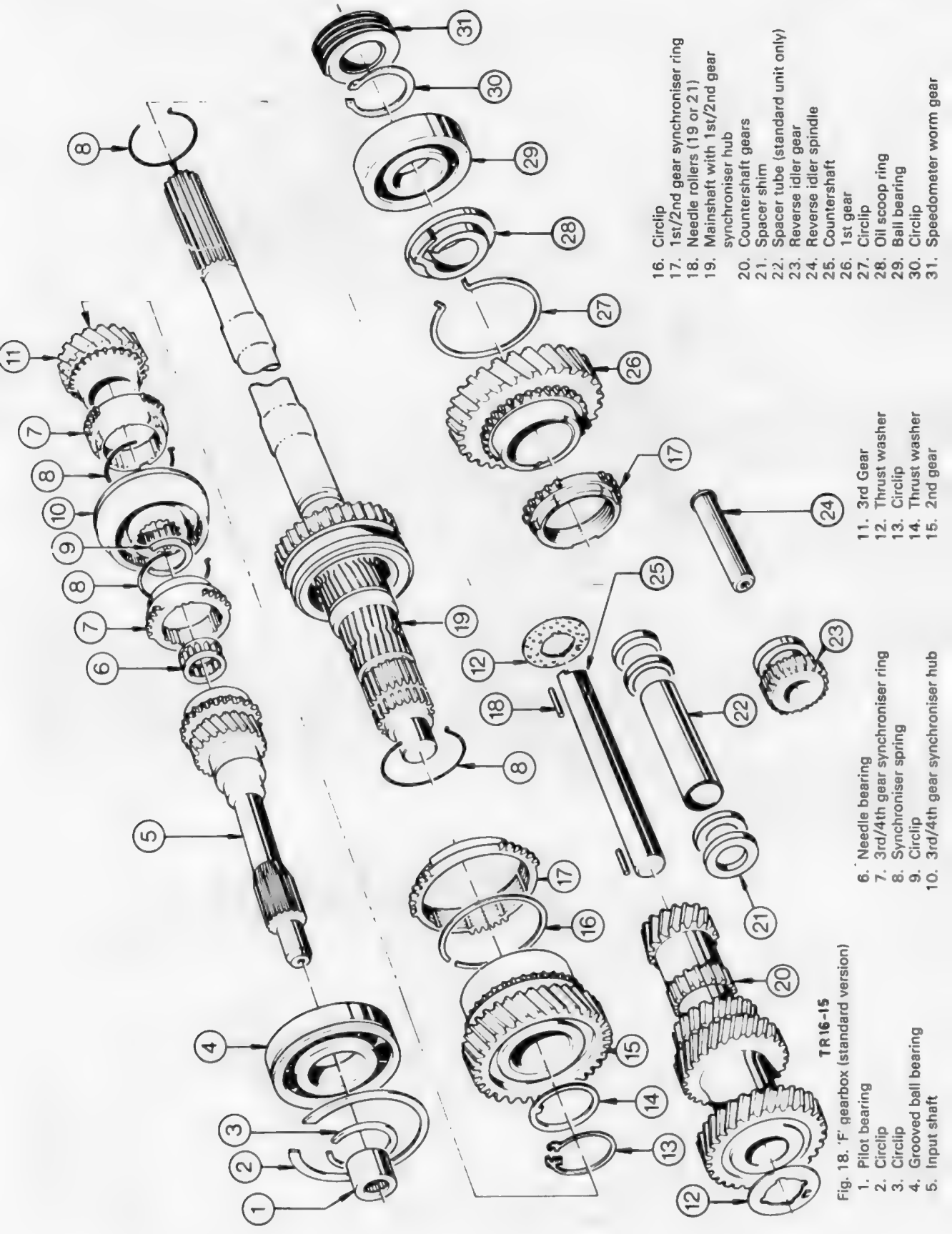


Fig. 18. 'F' gearbox (standard version)

1. Pilot bearing
2. Circlip
3. Circlip
4. Grooved ball bearing
5. Input shaft
6. Needle bearing
7. 3rd/4th gear synchroniser ring
8. Synchroniser spring
9. Circlip
10. 3rd/4th gear synchroniser hub
11. 3rd Gear
12. Thrust washer
13. Circlip
14. Thrust washer
15. 2nd gear
16. Circlip
17. 1st/2nd gear synchroniser ring
18. Needle rollers (19 or 21)
19. Mainshaft with 1st/2nd gear synchroniser hub
20. Countershaft gears
21. Spacer shim
22. Spacer tube (standard unit only)
23. Reverse idler gear
24. Reverse idler spindle
25. Countershaft
26. 1st gear
27. Circlip
28. Oil scoop ring
29. Ball bearing
30. Circlip
31. Speedometer worm gear

16 118 8 TRANSMISSION ASSEMBLY – OVERHAUL (Gearbox removed)

Special Service Tools Required:

Gearbox mounting bracket	16–009
Installer for extension housing bush and oil seal	16–015
Extension housing bush remover	16–025
Extension housing oil seal remover	17–001

To Dismantle

1. Unscrew oil plugs and drain oil.
2. Unbolt clutch housing (4 bolts).
3. Remove clutch thrust bearing with release lever, Fig. 19.

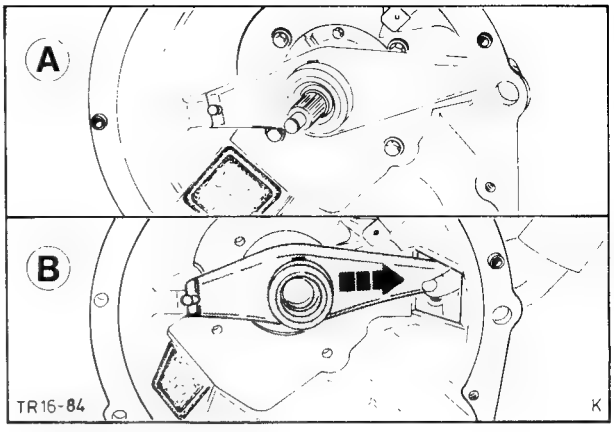


Fig. 19. Remove thrust bearing and release lever
A – Detach clutch housing
B – Remove release lever

4. Secure gearbox to stand with Special Tool No. 16–009 for further dismantling, Fig. 20.

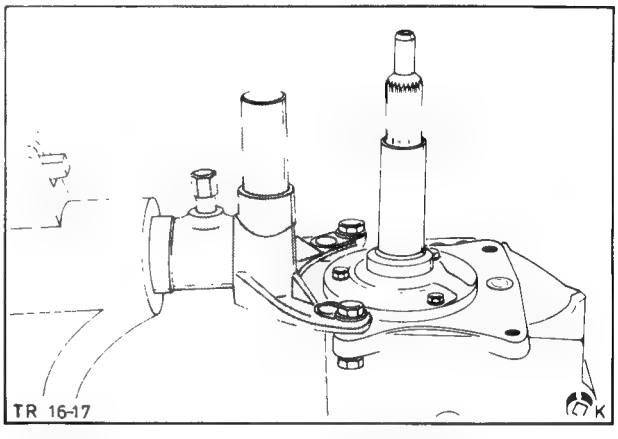


Fig. 20. Secure gearbox to stand with Special Tool No. 16–009

5. Detach selector housing from gearbox casing (7 bolts), Fig. 21.
6. Take out selector forks for 1st/2nd and 3rd/4th gears.

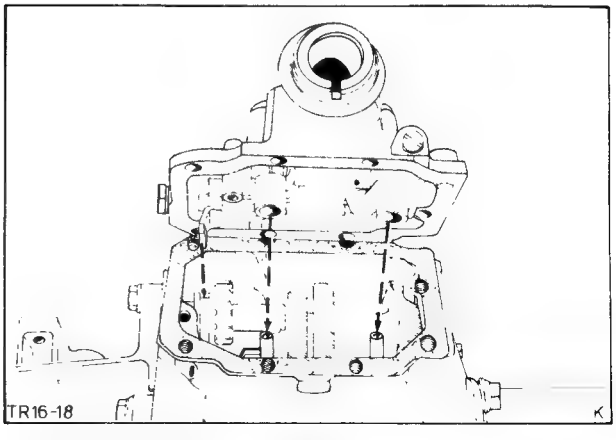


Fig. 21. Selector housing removed

7. Remove extension housing oil seal with Special Tool No. 17–001, Fig. 22.

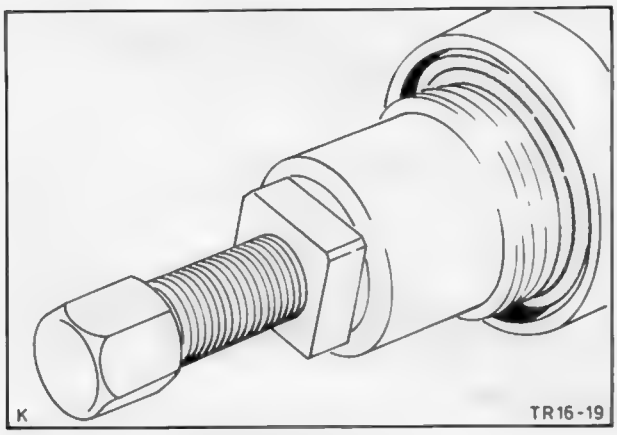


Fig. 22. Remove seal with Special Tool No. 17–001

8. Extract extension housing bush with Special Tool No. 16–025, Fig. 23.

Extension housing oil seal or bush can only be changed when extension housing and mainshaft are fitted in place.

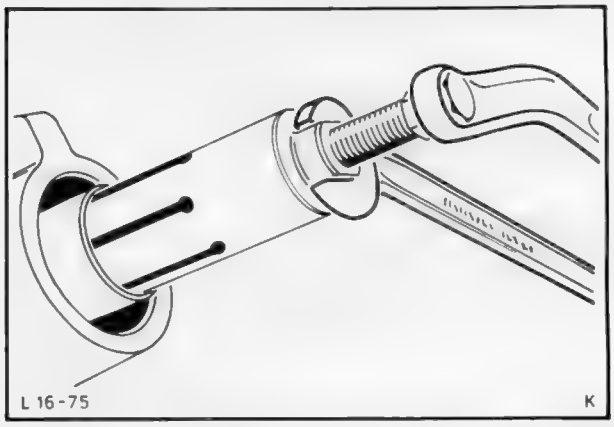


Fig. 23. Extract extension housing bush with Special Tool No. 16–025

9. Remove 4 bolts securing extension housing, pull extension housing out of seat in gearbox casing and turn until there is sufficient space to remove countershaft, Fig. 24.

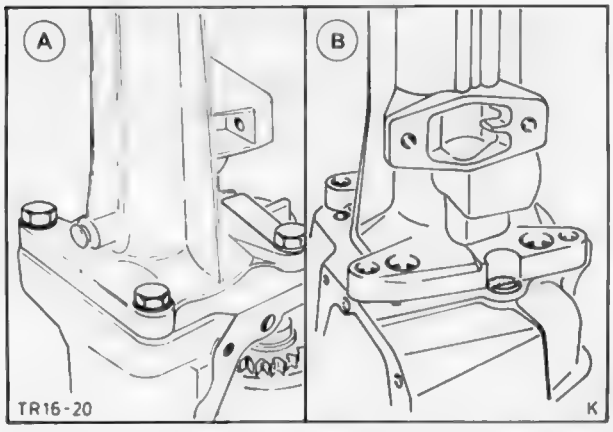


Fig. 24. With extension housing bolts removed, turn extension housing until countershaft can be removed

10. Tap countershaft *backwards* out of press fit from front end using dummy countershaft (countershaft shortened to a length of 177 mm).

Dummy countershaft must be in constant contact with countershaft so that the needle rollers do not fall out of place.

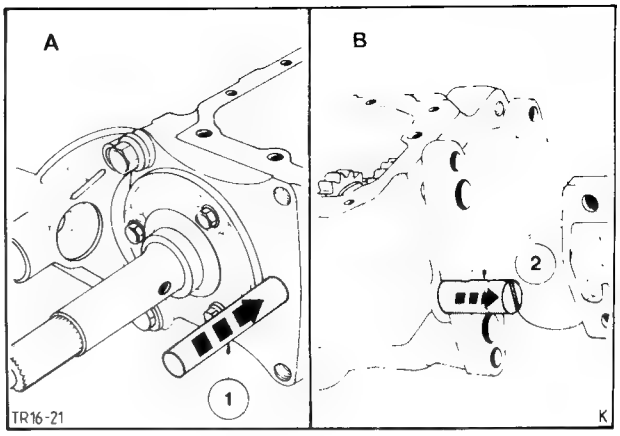


Fig. 25. Tap out countershaft
A1 – Dummy shaft (countershaft shortened to 177 mm)
B2 – Countershaft

11. Remove main drive gear bearing retainer (3 bolts), Fig. 26.

NOTE: When removing bearing retainer, make sure oil seal is not damaged. Replace if necessary when reassembling.

12. Move countershaft gears to one side, draw out input shaft towards the front.

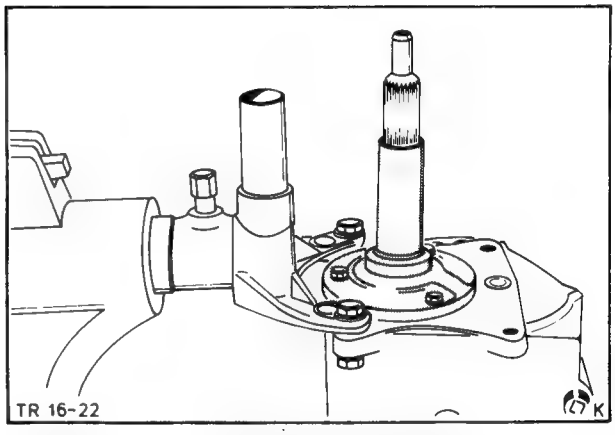


Fig. 26. Detach main drive gear bearing retainer

13. Remove extension housing with mainshaft assembly, Fig. 27.

14. Remove countershaft gears with dummy countershaft and 2 thrust washers from gearbox casing.

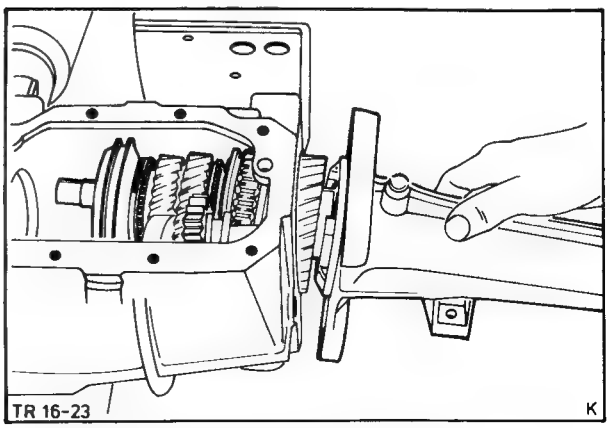


Fig. 27. Remove extension housing complete

15. Remove reverse gear idler shaft, Fig. 28. To do this, take a copper mandrel and drive reverse gear idler shaft out towards the rear, remove reverse gear.

    NOTE: Do not strike gearbox casing when removing idler shaft (risk of cracking).

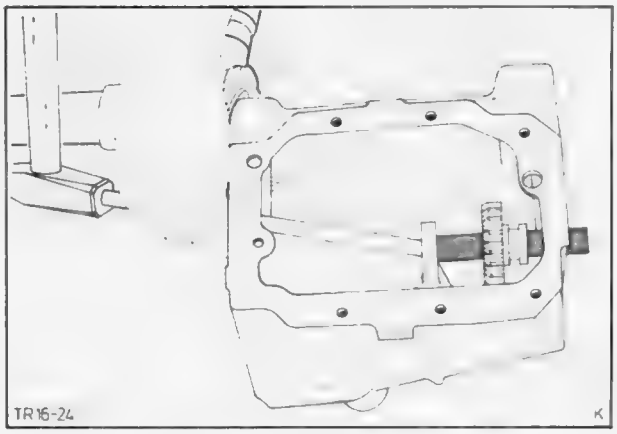


Fig. 28. Remove reverse gear idler shaft

16. Unscrew speedometer drive unit complete from gearbox extension housing. Then remove drive gear bearing, Fig. 29.

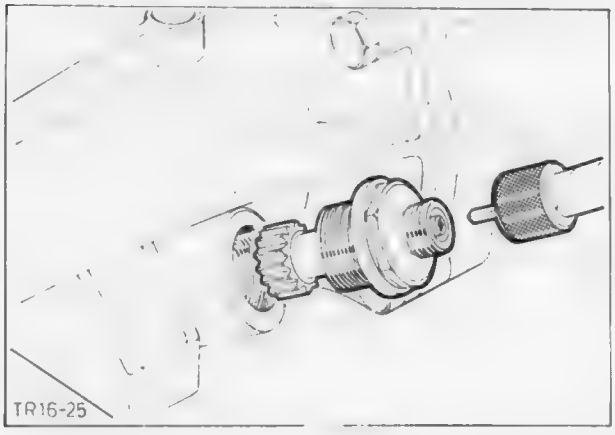


Fig. 29. Remove speedometer drive unit

To Dismantle Mainshaft

17. Remove mainshaft bearing retaining ring from groove in extension housing, Fig. 30. Drive mainshaft out of the extension housing using a copper hammer.

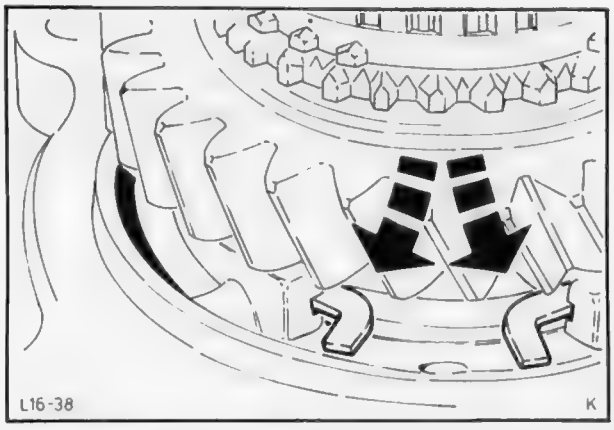


Fig. 30. Remove bearing retaining ring from extension housing

18. Remove circlip from 3rd/4th gear synchroniser hub. Detach synchroniser hub with 3rd gear by hand, Fig. 31.

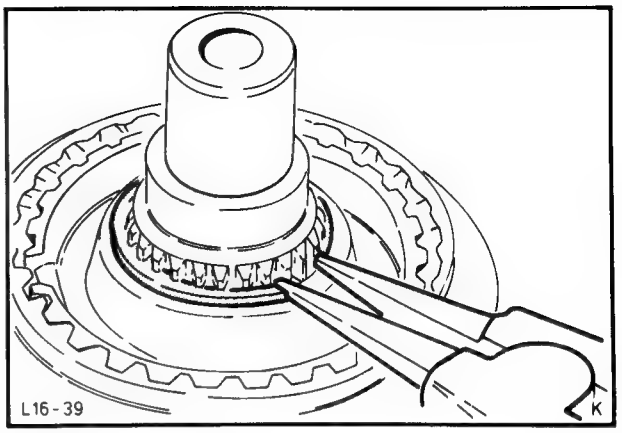


Fig. 31. Remove circlip from 3rd/4th gear synchroniser hub

19. After removing circlip and thrust washer, detach 2nd gear from mainshaft, Fig. 32.

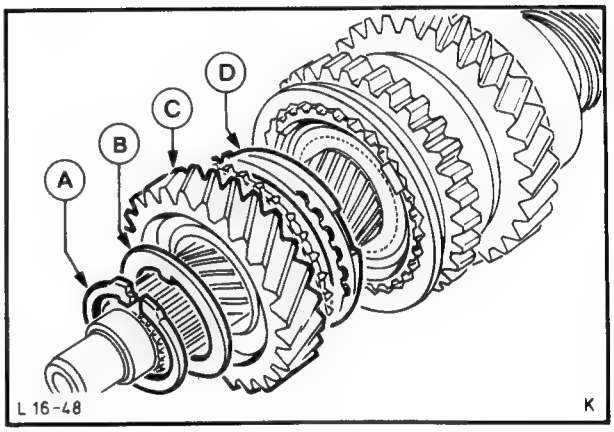


Fig. 32. Remove circlip, pull off 2nd gear
A – Circlip
B – Thrust washer
C – 2nd gear
D – Synchroniser ring

20. Dismantle 1st/2nd gear synchroniser assembly.

NOTE: 1st/2nd gear synchroniser hub and mainshaft are fitted together to form a unit, Fig. 33.

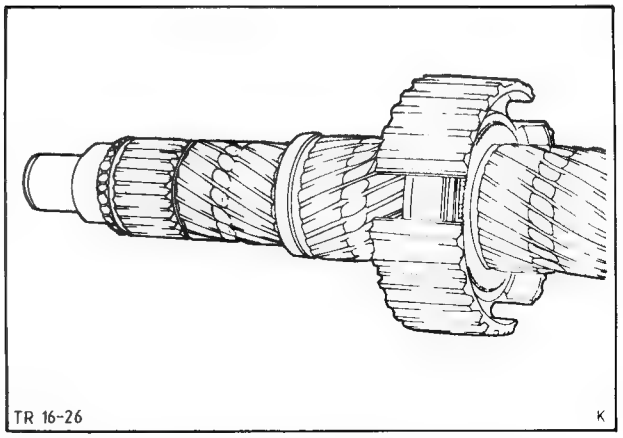


Fig. 33. Mainshaft with 1st/2nd gear synchroniser hub

21. Remove mainshaft bearing circlip at the rear. Press off ball bearing and speedometer worm gear, Fig. 34.

    NOTE: To remove the bearing, locate a suitable U-shaped remover under 1st gear.

22. Then detach spacer ring and extension housing circlip.

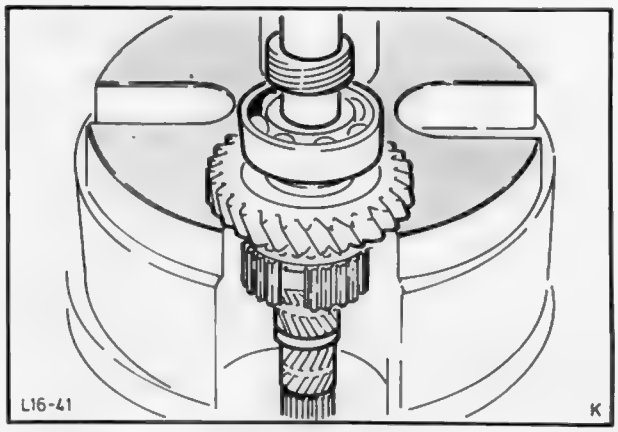


Fig. 34. Press off mainshaft bearing

23. Dismantle 3rd/4th gear synchroniser hub, Fig. 35. Remove selector ring, blocker bars and springs.

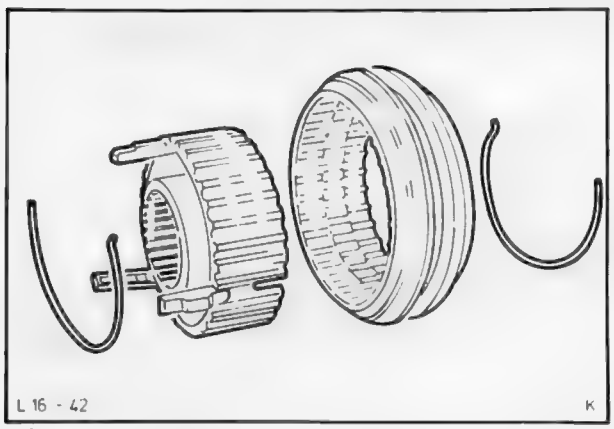


Fig. 35. Synchroniser hub exploded

To Reassemble Mainshaft

24. Assemble 3rd/4th gear synchroniser hub: insert blocker bars and fit springs so that they are staggered with their opposite ends located in the same blocker bar, Fig. 36.

    The marks on selector ring and hub must coincide.

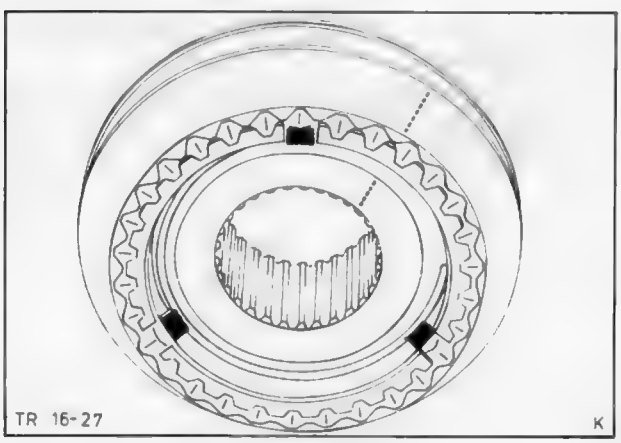


Fig. 36. Synchroniser hub reassembled

25. Insert 1st gear synchroniser spring in hub, Fig. 37. To do this, first insert blocker bars and then fit the synchroniser springs offset relative to one another, starting with the same blocker bar.

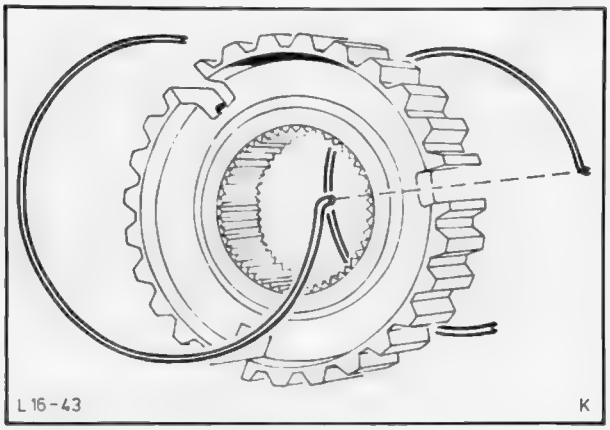


Fig. 37. Fit synchroniser springs

26. Slide 1st gear with synchroniser ring and oil scoop ring onto the mainshaft, Fig. 38.

NOTE: Large diameter oil scoop ring faces the ball bearing side.

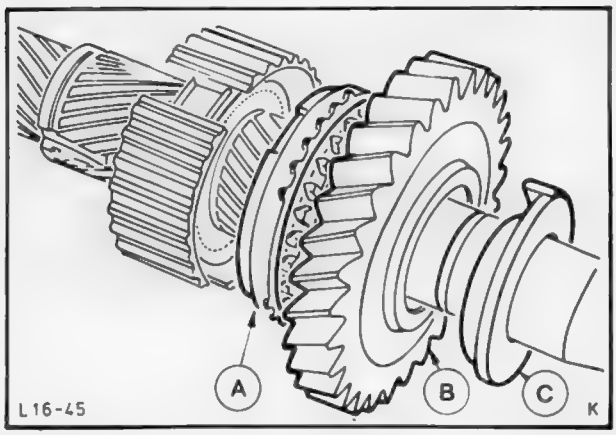


Fig. 38. Slide 1st gear with synchroniser ring and oil scoop ring onto mainshaft
A – Synchroniser ring
B – 1st gear
C – Oil scoop ring

27. Establish thickness of extension housing circlip for mainshaft bearing. **When using a new bearing or a new extension housing, the thickness of the circlip must be established as follows:**

Locate circlip in the groove in the extension housing and press outwards so that it bears on the shoulder. Measure distance between bearing stop and top edge of circlip exactly (total height) using a depth gauge, Fig. 39. Measure breadth of bearing to be fitted and deduct bearing width from total height, Fig. 40. This gives the circlip thickness.

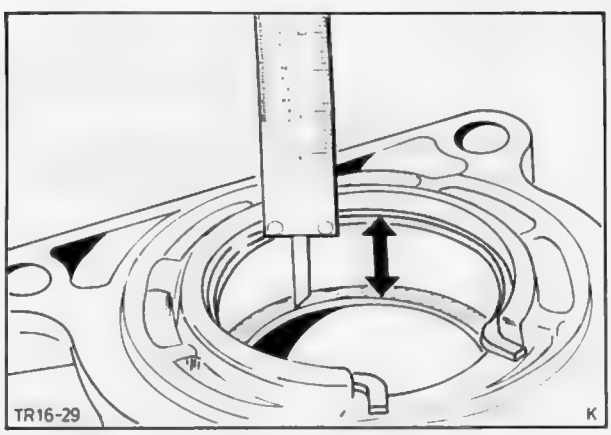


Fig. 39. Establish circlip thickness

Example

Total height	17,98 mm
Bearing width	15,92 mm
Required circlip	2,06 mm

From the available range of circlip thicknesses (see Parts Catalogue) choose one of this size and fit it loosely on the mainshaft. **The circlip used must not have any axial play.**

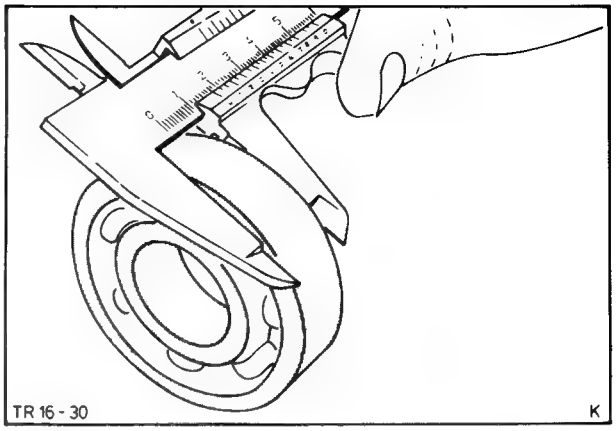


Fig. 40. Measure thickness of mainshaft bearing

28. Coat bearing seat on the mainshaft with multi-purpose grease, fit bearing and insert circlip.

    NOTE: Circlip must not have any axial play. If it does, select the right circlip from the range in the Parts Catalogue.

29. Fit speedometer worm gear, Fig. 41.

    NOTE: Distance between ball bearing and speedometer worm gear outer edge must be 82,25 mm

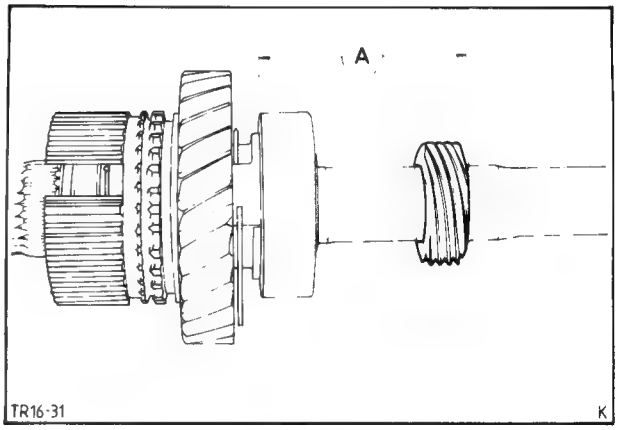


Fig. 41. Location of speedometer worm gear
A – 82,25 mm

30. Reassemble 1st/2nd gear synchroniser hub: insert blocker bars and fit synchroniser springs staggered with their opposite ends in the same blocker bar, Fig. 42.

    NOTE: Marks on sliding gear and hub must coincide, with selector groove pointing to front.

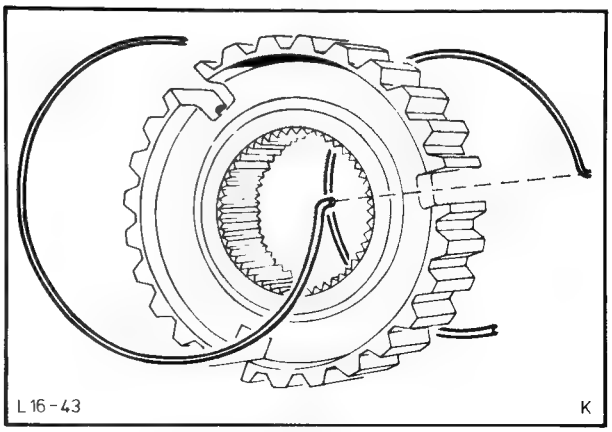


Fig. 42. Insert synchroniser springs

31. Slide 2nd gear with synchroniser ring and thrust washer onto mainshaft, fit circlip, Fig. 43.

    NOTE: Locate circlip correctly.

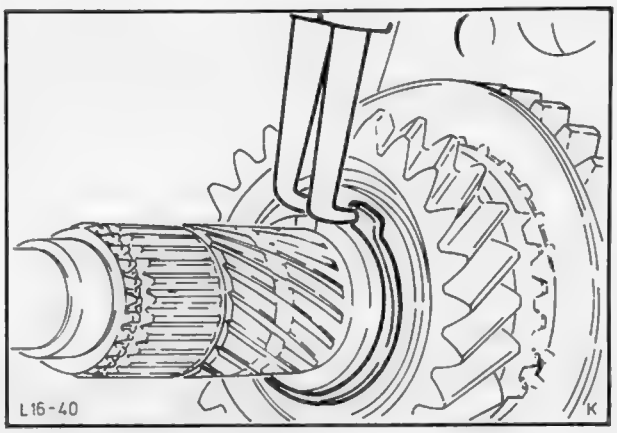


Fig. 43. 2nd gear with thrust washer and circlip fitted

32. Slide 3rd gear with synchroniser ring onto the mainshaft, Fig. 44.

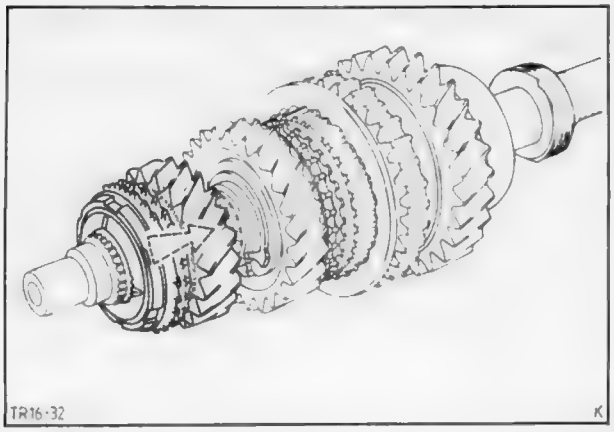


Fig. 44. Slide 3rd gear and synchroniser ring onto mainshaft

33. Slide 3rd/4th gear synchroniser hub onto the mainshaft with the long side of the hub to the front, fit circlip, Fig. 45.

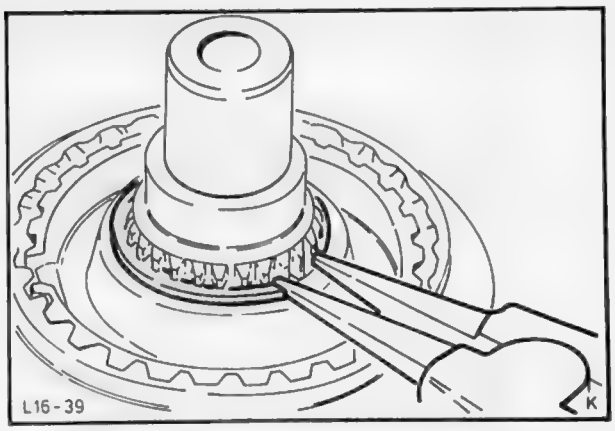


Fig. 45. Fit circlip to 3rd/4th gear synchroniser hub

34. Warm extension housing in hot water and fit to mainshaft assembly. Insert previously loosely fitted circlip in the groove in the extension housing, Fig. 46.

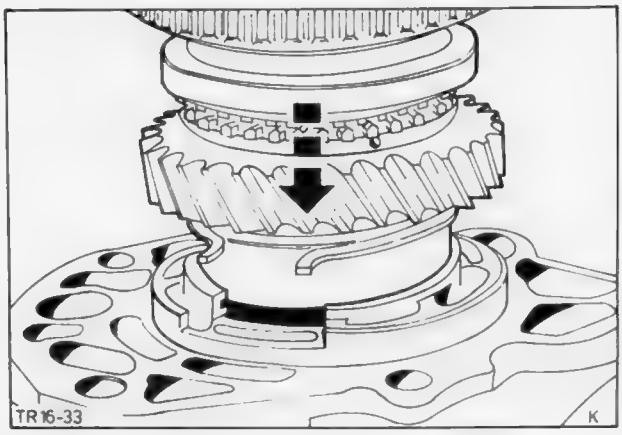


Fig. 46. Insert mainshaft in extension housing

To Overhaul Input Shaft and Countershaft Gears

35. Detach circlip from input shaft and press off input shaft bearing, Fig. 47.

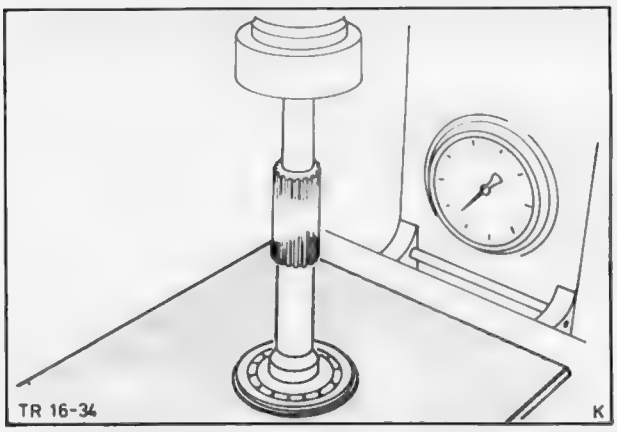


Fig. 47. Press off input shaft bearing

36. Coat bearing seat on input shaft with multi-purpose grease, press on ball bearing and fit circlip.

37. Remove dummy shaft from countershaft gear train, Fig. 48, remove the 19 or 21 needle rollers with the spacer shims (2 each) on either side of the gear train. Remove spacer tube.

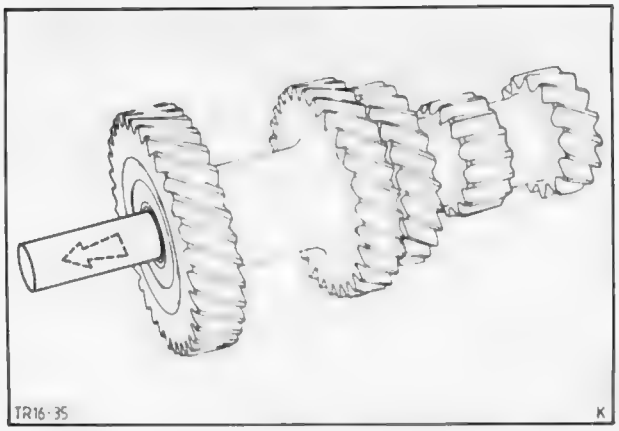


Fig. 48. Remove dummy shaft from countershaft gear train

38. Reassemble countershaft gear train: slide dummy shaft with spacer tube into gear train, fill space between shaft and bore with multi-purpose grease then introduce needle rollers and spacer shims, Fig. 49.

NOTE: Long needle rollers at the rear.

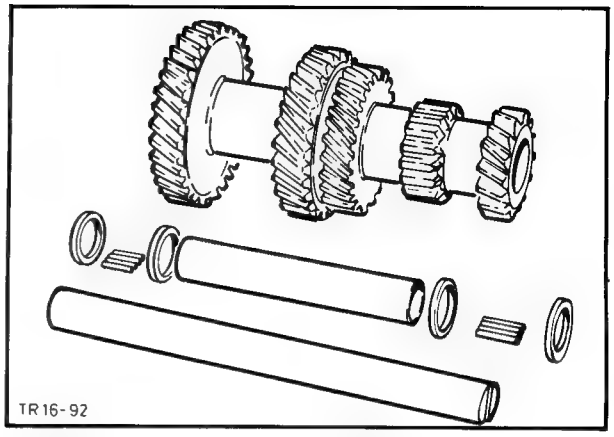


Fig. 49. Countershaft gear train dismantled

39. Remove oil seal of main drive gear bearing retainer, Fig. 50.

40. Using a suitable piece of tube, carefully insert new bearing retainer oil seal with the sealing lip facing the gearbox casing when in position. First coat sealing lip with multi-purpose grease.

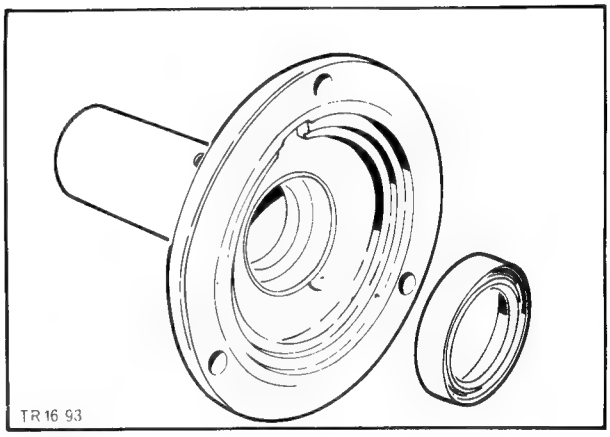


Fig. 50. Bearing retainer oil seal

To Reassemble Gearbox

Clean all parts thoroughly and lightly coat with specified gearbox oil before installing.

Bolts which come into contact with the gearbox oil chamber must be coated with sealing compound.

41. Fit reverse idler gear with selector groove to the rear. Insert shaft and tap in with copper hammer until about 0,2 to 0,8 mm countersunk, Fig. 51. First grease shaft with multi-purpose grease G3-7140.

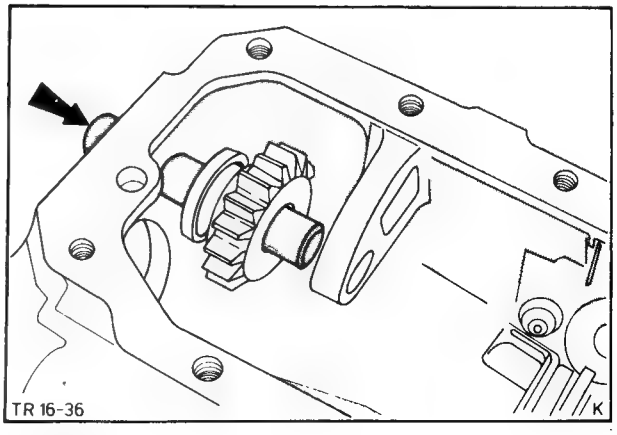


Fig. 51. Fit reverse idler gear

42. Stick front thrust washer of countershaft gear train to recess in gearbox casing with grease, Fig. 52.

43. Place countershaft gear train with dummy shaft in gearbox casing and fit rear thrust washer.

NOTE: Thrust washers must not be moved.

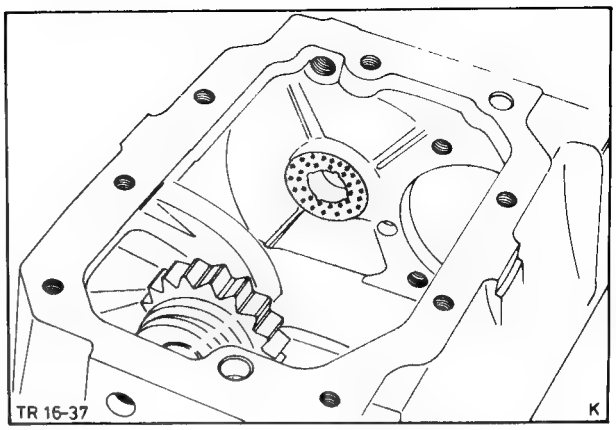


Fig. 52. Stick thrust washers of countershaft gear train to gearbox casing

44. Fit extension housing with mainshaft and then turn housing so that the countershaft can be installed, Fig. 53.

NOTE: Stick extension housing gasket to flange using grease so as to avoid damage.

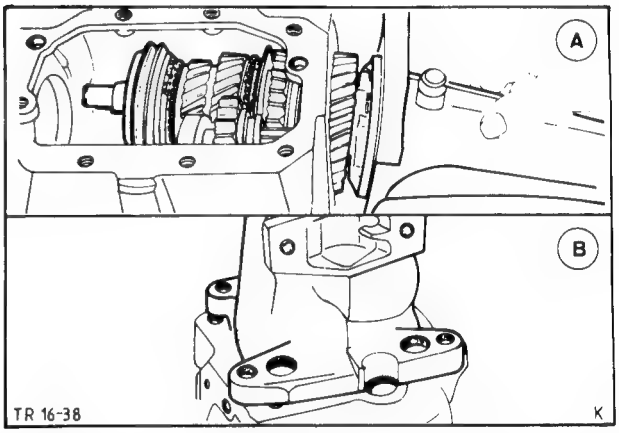


Fig. 53. A/B – Fit extension housing and then turn so that hole for countershaft is accessible

45. Oil needle bearing and fit to input shaft. Slide synchroniser ring over input shaft cone.

46. Slide input shaft with ball bearing into gearbox casing until the circlip on the outside rests against the casing, Fig. 54.

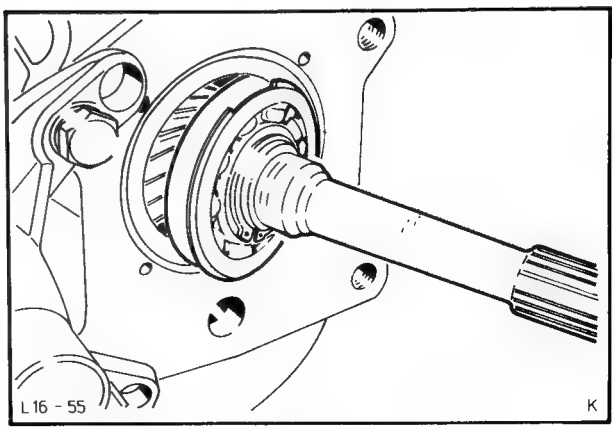


Fig. 54. Slide input shaft into casing

47. Fit main drive gear bearing retainer with a new gasket, Fig. 55.

NOTE: Fit bolts coated with sealing compound. Oil port must line up with hole in gasket and bearing retainer.

When fitting the bearing retainer, bind input shaft splining (with adhesive tape or the like) to avoid damaging oil seal.

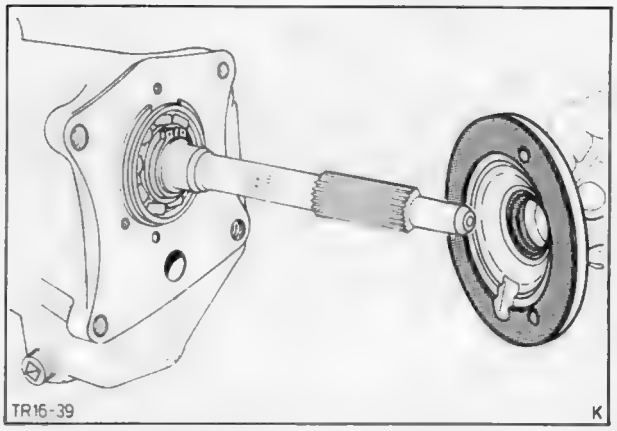


Fig. 55. Fit main drive gear bearing retainer

48. Turn gearbox through 180° until countershaft gear train engages with main and input shafts. Then line up countershaft gear train with the holes in the casing, ensuring correct seating of thrust washers at the same time. Tap countershaft into the casing from the rear, keeping it in constant contact with the dummy shaft, and drive in flush with a copper hammer (on clutch housing side). Remove dummy shaft.

NOTE: The flattened end of the shaft must be **horizontal**, Fig. 56.

Then turn gearbox casing back into correct position.

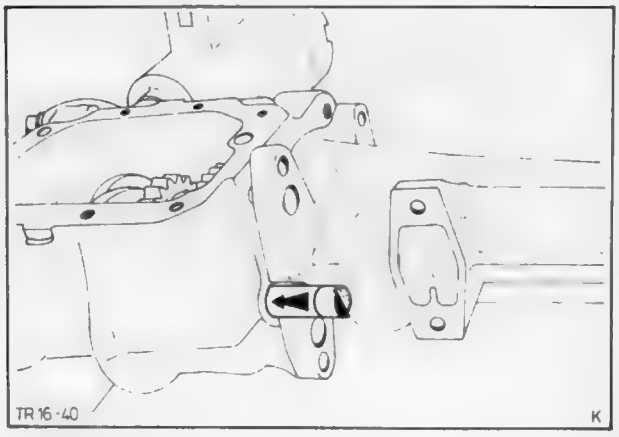


Fig. 56. Fit countershaft

49. Line up extension housing, coat bolts (4) with sealing compound and insert then tighten, Fig. 57.

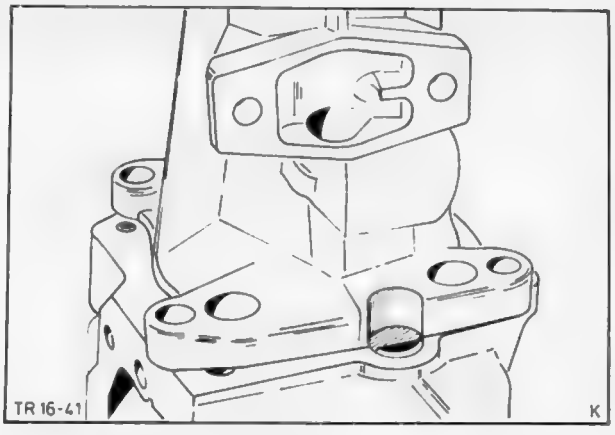


Fig. 57. Extension housing lined up

50. Fit extension housing bush with Special Tool No. 16–015, Fig. 58.

    The bush must be installed so that the oil return groove sits in the extension housing at the bottom and to the rear, thereby ensuring that the gap (notch) in the bush is not located over the oilway.

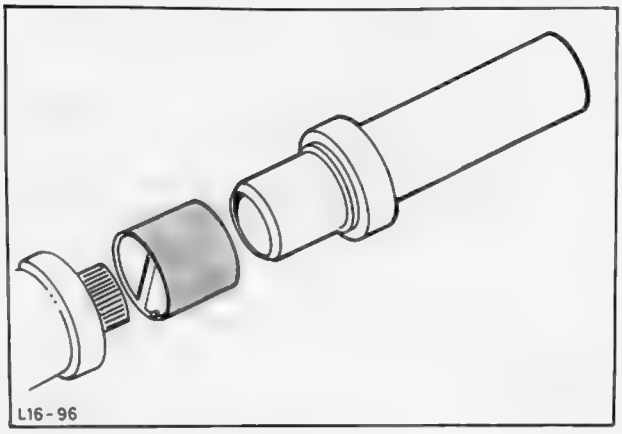


Fig. 58. Press in extension housing bush with Special Tool No. 16–015

51. Coat extension housing oil seal with multi-purpose grease and fit seal with Special Tool No. 16–015, Fig. 59.

52. Screw in speedometer drive unit complete (gear and bearing). First coat thread with sealing compound.

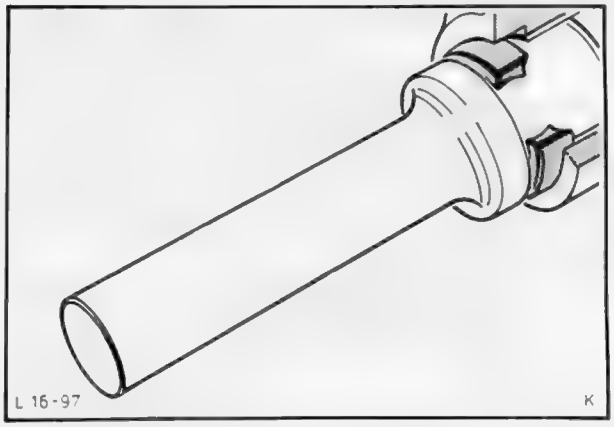


Fig. 59. Fit oil seal with Special Tool No. 16–015

53. Install selector forks for 1st/2nd and 3rd/4th gears with the cast number facing the front, Fig. 60.

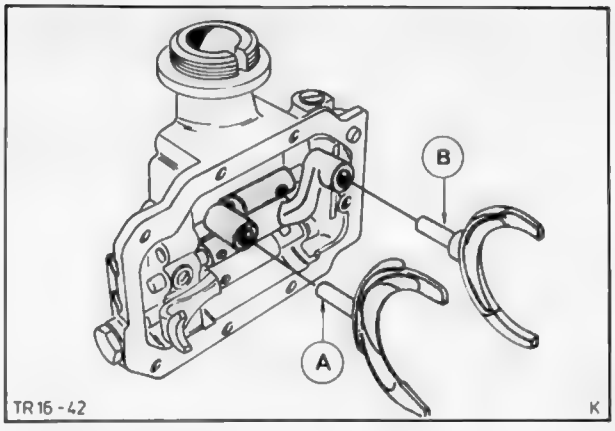


Fig. 60. Fit selector forks
A – 1st/2nd gear fork
B – 3rd/4th gear fork

54. Fit the selector housing with new gasket, Fig. 61.

    NOTE: Coat bolts with sealing compound before inserting.

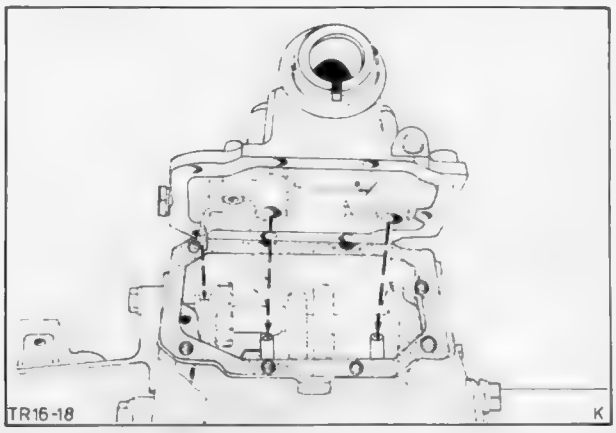


Fig. 61. Fit selector housing

55. Detach gearbox from stand, Fig. 62.

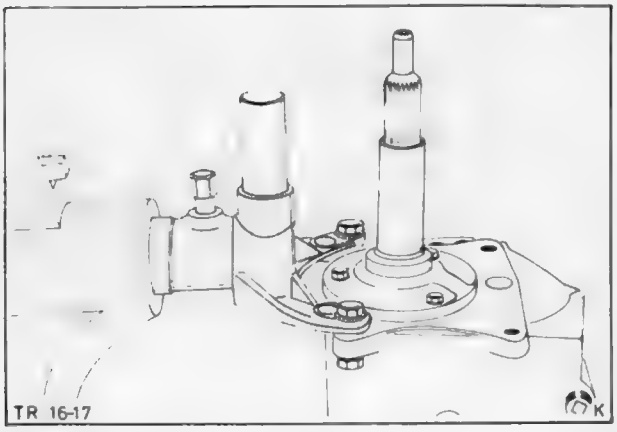


Fig. 62. Detach gearbox from stand

56. Assemble clutch thrust bearing and release lever and secure with circlip, Fig. 63. Then insert release lever in clutch housing.

57. Attach clutch housing, coating through-bolts with sealing compound before insertion, then torque bolts as specified.

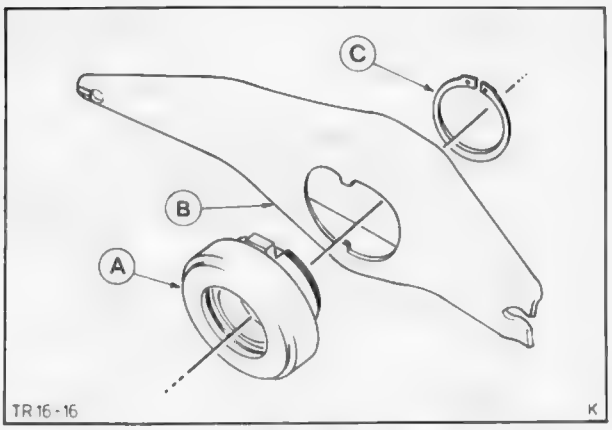


Fig. 63. Fit clutch thrust bearing with release lever
A – Thrust bearing
B – Release lever
C – Circlip

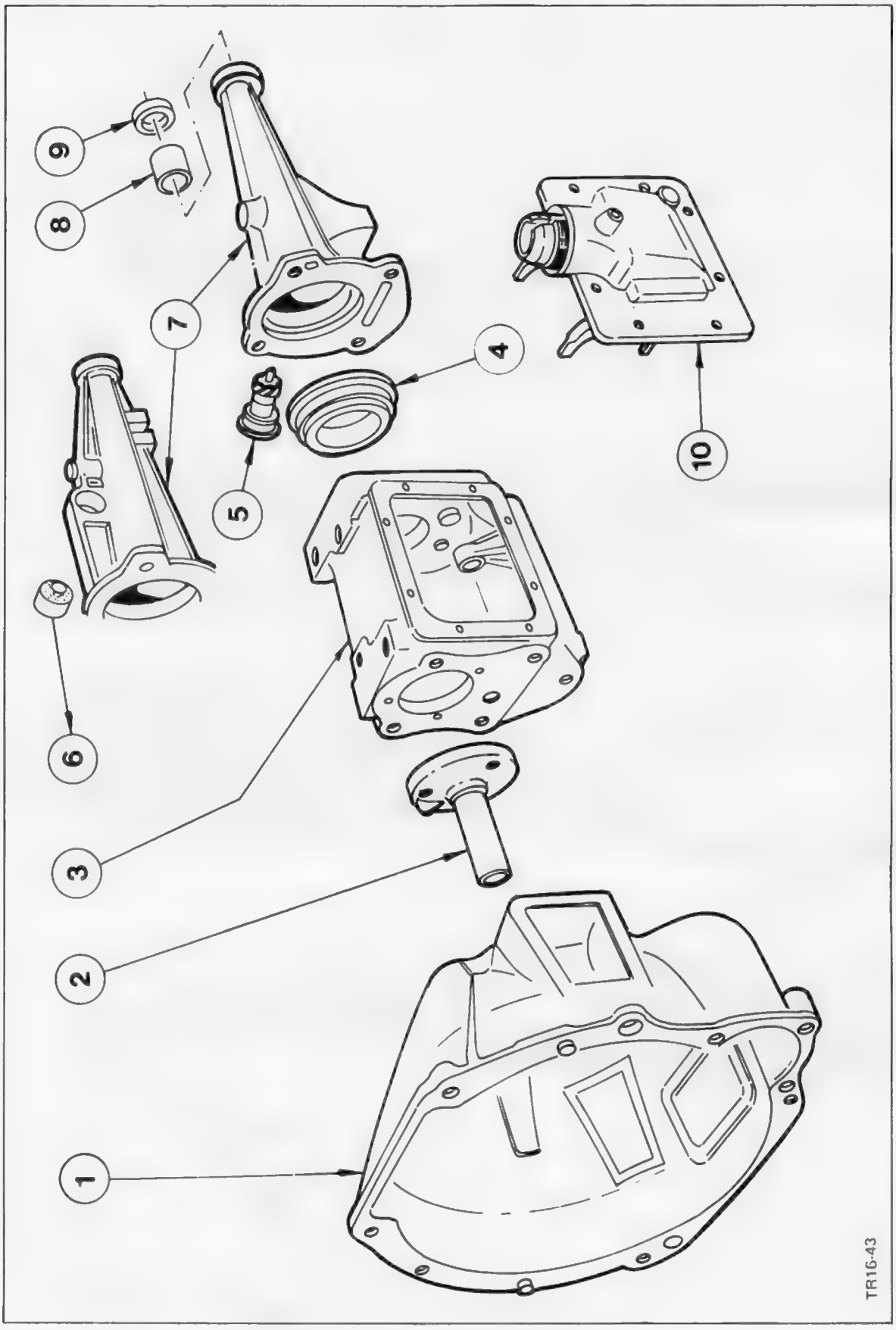


Fig. 64. 1. Clutch housing
2. Main drive gear bearing retainer
3. Gearbox casing
4. Bearing retainer
5. Speedometer drive pinion
6. Rubber bush – extension housing
7. Extension housing
8. Extension housing bush
9. Oil seal
10. Selector housing

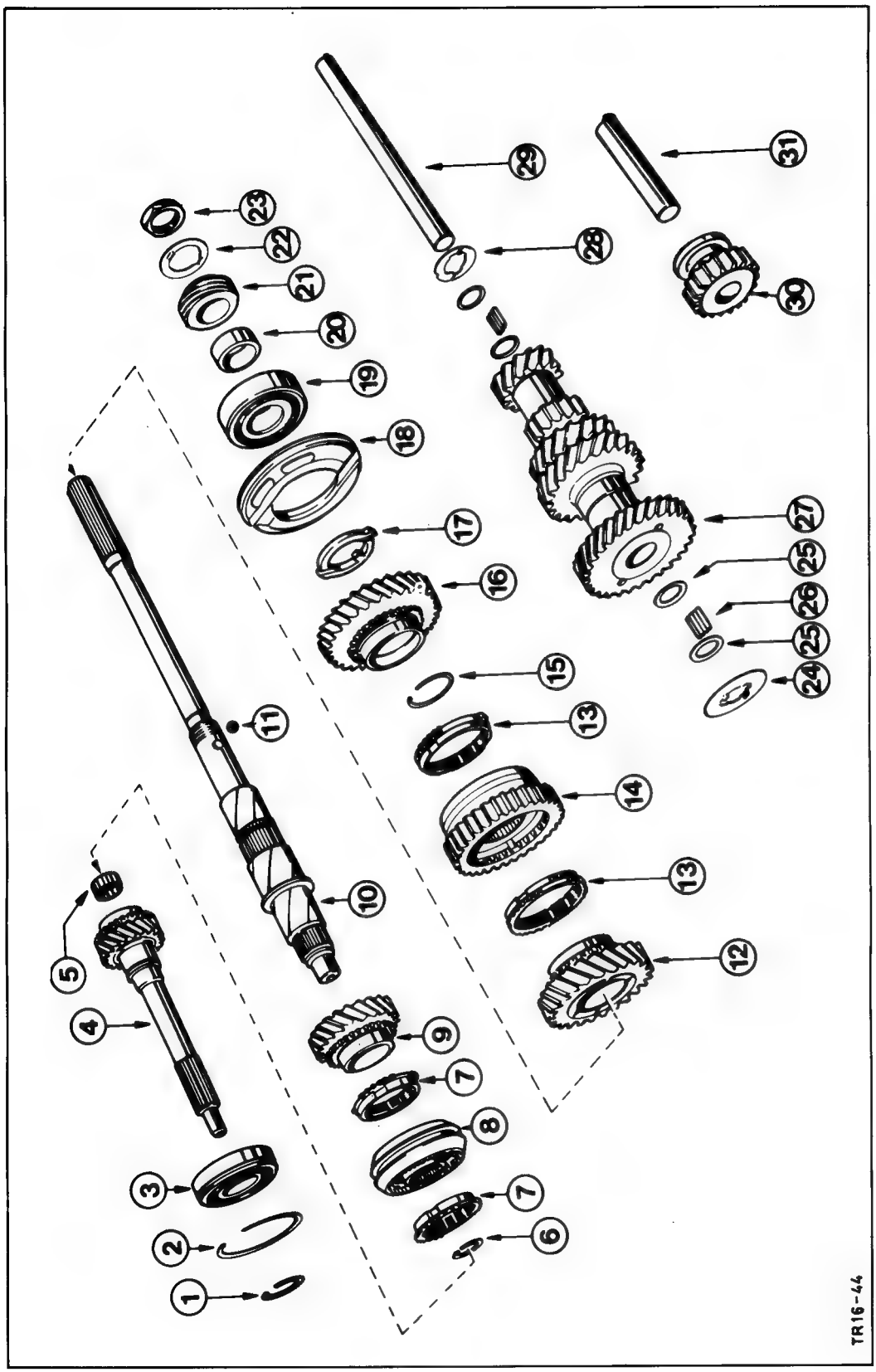


Fig. 65.

1. Circlip
2. Circlip
3. Ball bearing
4. Input shaft
5. Needle bearing
6. Circlip
7. Synchroniser sleeve (3rd/4th gear hub)
8. 3rd/4th gear synchroniser hub
9. 3rd gear
10. Mainshaft
11. Speedometer worm locking ball
12. 2nd gear
13. Synchroniser sleeve (1st/2nd gear hub)
14. 1st/2nd gear synchroniser hub
15. Circlip
16. 1st gear
17. Oil scoop ring
18. Bearing retainer
19. Ball bearing
20. Spacer sleeve
21. Speedometer worm
22. Lock washer
23. Mainshaft nut
24. Thrust washer
25. Spacer shim
26. Needle rollers (22)
27. Countershaft gears
28. Thrust washer
29. Countershaft
30. Reverse gear idler
31. Idler shaft

16 118 8 TRANSMISSION ASSEMBLY – OVERHAUL (Gearbox removed)

Special Service Tools Required:

Dummy countershaft	16–003
Gearbox mounting bracket	16–009
Extension housing bush remover	16–011
Extension housing bush and oil seal installer	16–016
Mainshaft nut wrench	16–027
Extension housing oil seal remover	17–001

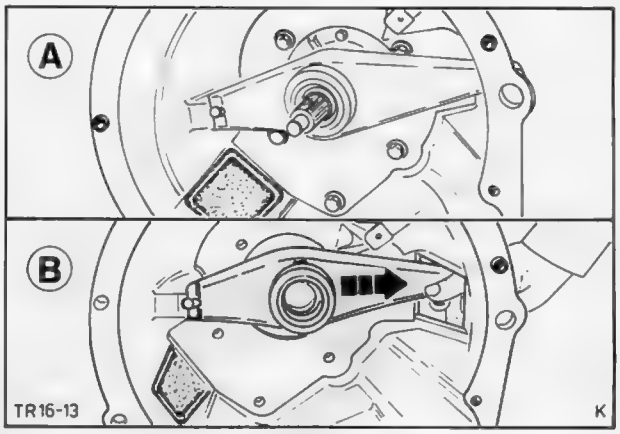


Fig. 66. Remove thrust bearing with release lever
A – Unbolt clutch housing
B – Remove release lever

To Dismantle Gearbox

1. Unscrew oil plug and drain oil.
2. Detach clutch housing and thrust bearing with release lever (5 bolts), Fig. 66. Separate clutch housing, thrust bearing and release lever.
3. Secure gearbox to stand with Special Tool No. 16–009 for further dismantling, Fig. 67.

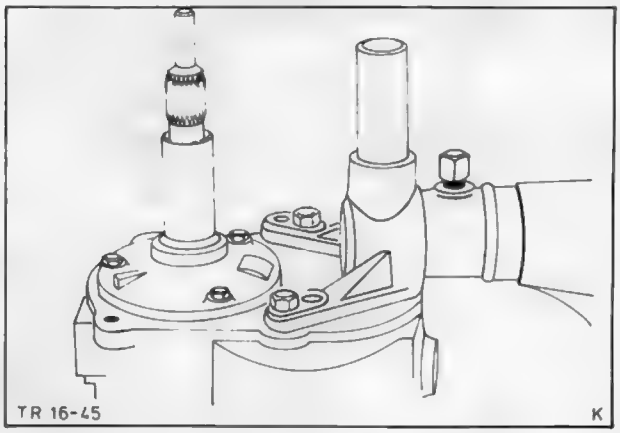


Fig. 67. Secure gearbox to stand with Special Tool No. 16–009

4. Detach gearbox selector housing (8 bolts), Fig. 68.

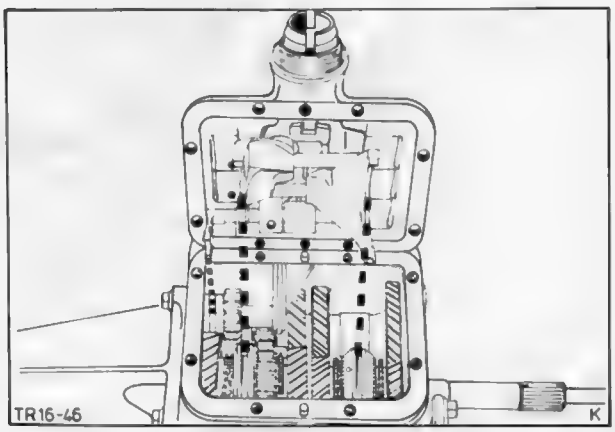


Fig. 68. Gearbox selector housing removed

5. Remove extension housing oil seal with Special Tool No. 17–001, Fig. 69.

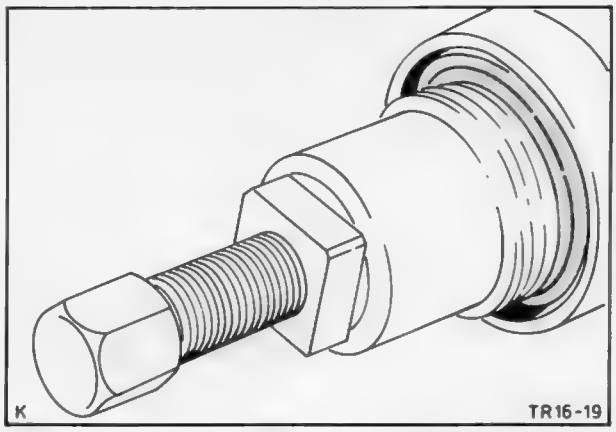


Fig. 69. Remove oil seal with Special Tool No. 17–001

6. Extract extension housing bush with Special Tool No. 16–011, Fig. 70.

Extension housing oil seal or bush can only be changed while extension housing and mainshaft are installed.

Remove bolts (4) securing extension housing. Draw extension housing out of seat in casing and remove.

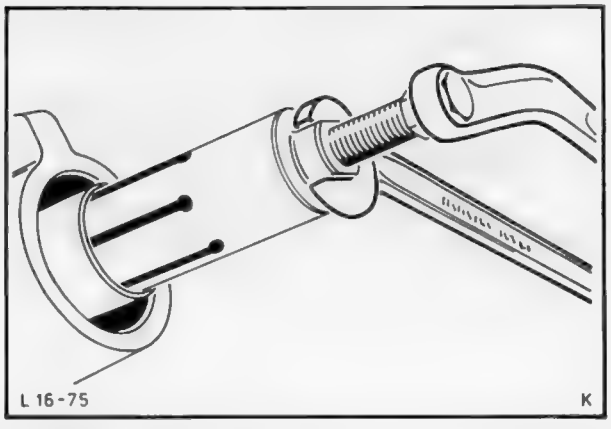


Fig. 70. Extract extension housing bush with Special Tool No. 16–011

7. Drive countershaft out of press fit from front **towards the rear** using Special Tool No. 16–003, Fig. 71. Lower countershaft gear train.

Dummy countershaft 16–003 must remain in constant contact with the countershaft so that the needle rollers do not drop out.

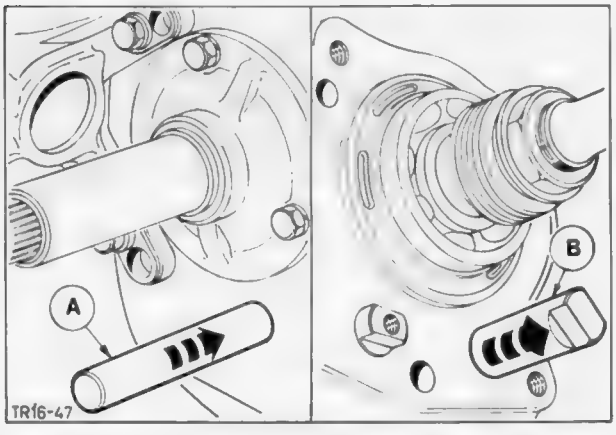


Fig. 71. Push out countershaft with Special Tool No. 16–003
A – Special Tool No. 16–003
B – Countershaft

8. Draw extension housing with mainshaft complete from gearbox casing and remove input shaft needle roller bearing, Fig. 72.

   NOTE: Move countershaft gear train away slightly.

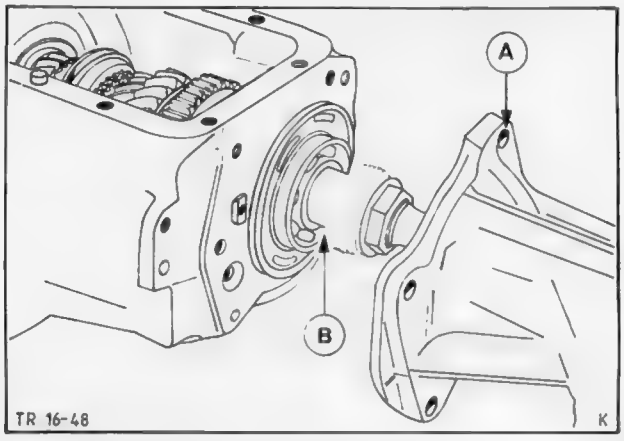


Fig. 72. Withdraw complete extension housing
A – Extension housing
B – Mainshaft complete

9. Remove main drive gear bearing retainer (3 bolts), Fig. 73. Then pull out input shaft.

   NOTE: When removing main drive gear bearing retainer, make sure oil seal is not damaged. Replace if necessary on reassembly.

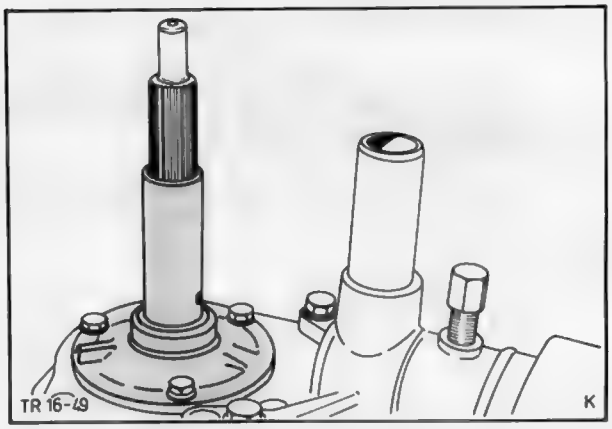


Fig. 73. Remove main drive gear bearing retainer

10. Remove reverse gear idler shaft. Screw an M8×60 mm (5/16 in×24G) bolt fitted with a nut, washer and socket into the idler shaft. Draw out shaft by tightening the nut, Fig. 74.
11. Remove countershaft gear train complete with dummy shaft and 2 thrust washers from gearbox casing.

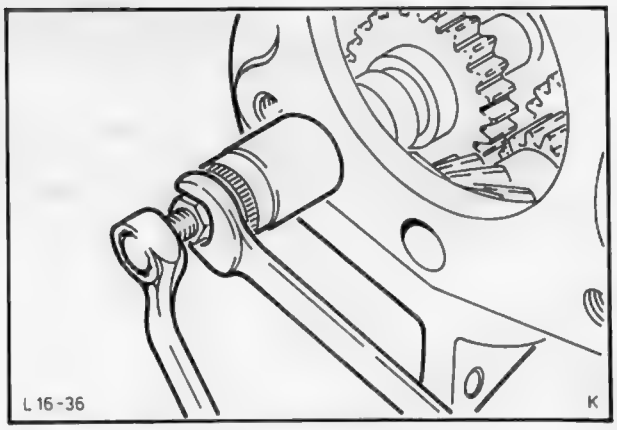


Fig. 74. Remove reverse gear idler shaft

To Dismantle Mainshaft

12. Remove circlip of 3rd/4th gear synchroniser hub and pull off synchroniser hub and 3rd gear with suitable remover, Fig. 75.

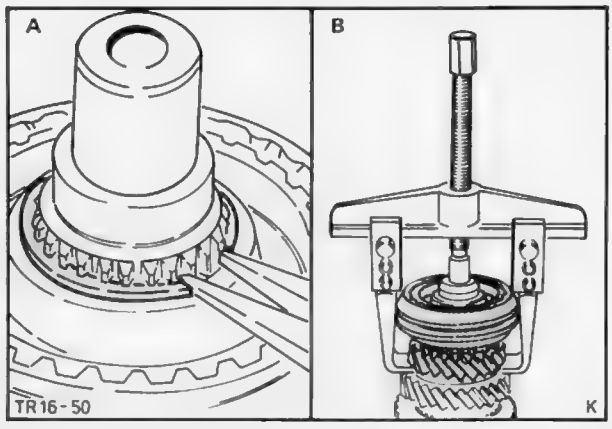


Fig. 75. A – Remove circlip of 3rd/4th gear synchroniser hub
B – Remove 3rd/4th gear synchroniser hub and 3rd gear

13. Unlock mainshaft nut and remove with Special Tool No. 16–027, Fig. 76.
14. Pull off speedometer worm gear and remove interlock ball.

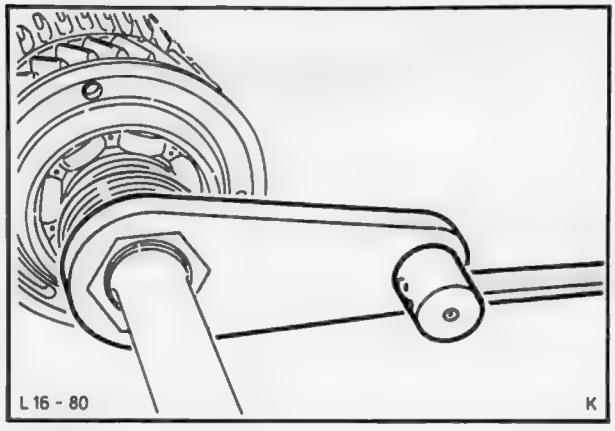


Fig. 76. Remove mainshaft nut with Special Tool No. 16–027

15. Remove spacer sleeve and press off ball bearing complete with bearing retainer, Fig. 77.
16. Remove ball bearing from retainer.

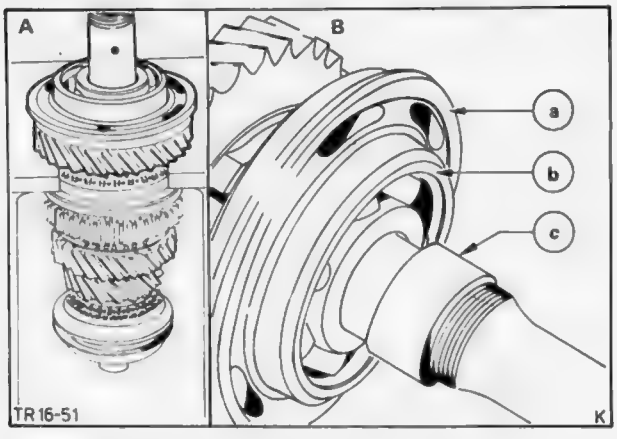


Fig. 77. A – Bearing with retainer and spacer sleeve
B – Remove bearing and retainer
a – Retainer
b – Bearing
c – Spacer

17. Remove oil scoop ring and 1st gear, Fig. 78.

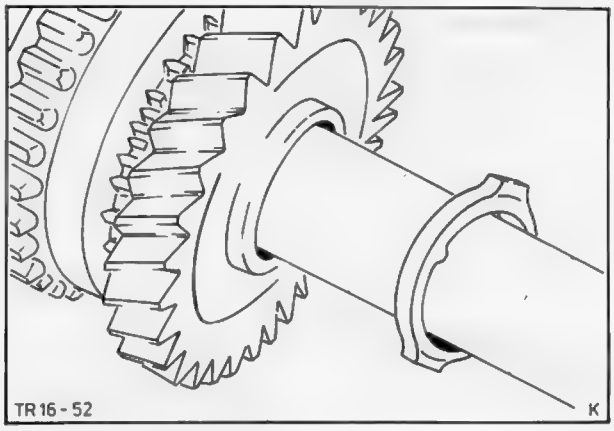


Fig. 78. Remove oil scoop ring and 1st gear

18. Detach circlip of 1st/2nd gear synchroniser hub, Fig. 79.
19. Remove synchroniser hub with 2nd gear.

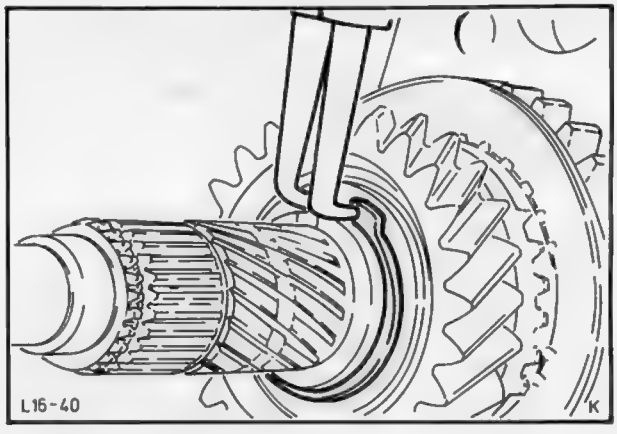


Fig. 79. Remove circlip of 1st/2nd gear synchroniser hub

20. Dismantle synchroniser hubs, Fig. 80.
NOTE: Check marks on hub and selector ring.

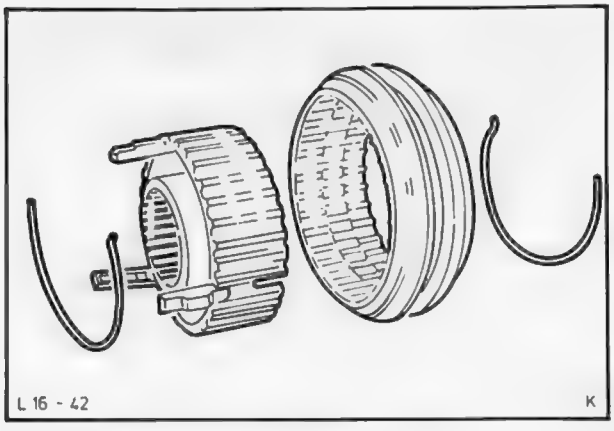


Fig. 80. Synchroniser hub dismantled

To Reassemble Mainshaft

Clean all parts thoroughly, check them and lubricate lightly with specified gearbox oil before installing.

21. Assemble synchroniser hubs.

NOTE: Peripheral groove on sliding gear and bearing face of hub must line up one above the other.

Insert blocker bars and fit synchroniser springs staggered with their opposite ends located in the same blocker bar, Fig. 81.

Marks on selector ring and hub must line up.

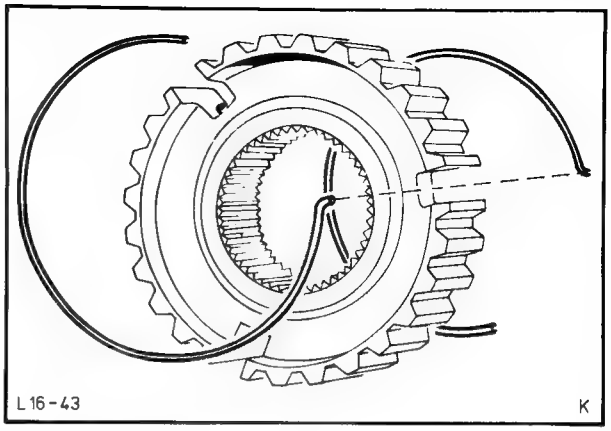


Fig. 81. Fit synchroniser springs

22. Fit 2nd gear with synchroniser ring, Fig. 82, and 1st/2nd gear synchroniser hub and secure with circlip.

NOTE: Peripheral groove on sliding gear must point towards the rear.

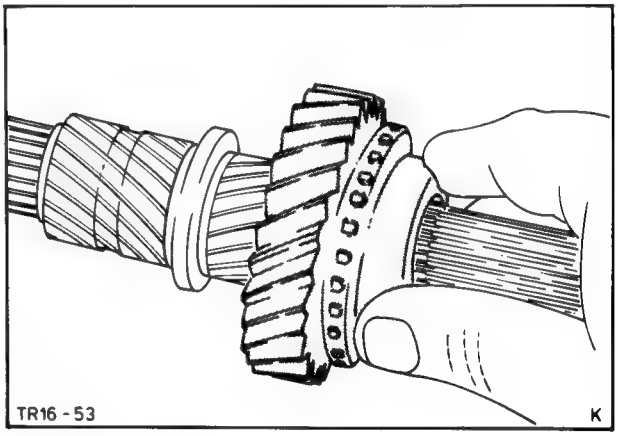


Fig. 82. Fit 2nd gear

23. Fit 1st gear with synchroniser hub, Fig. 83.

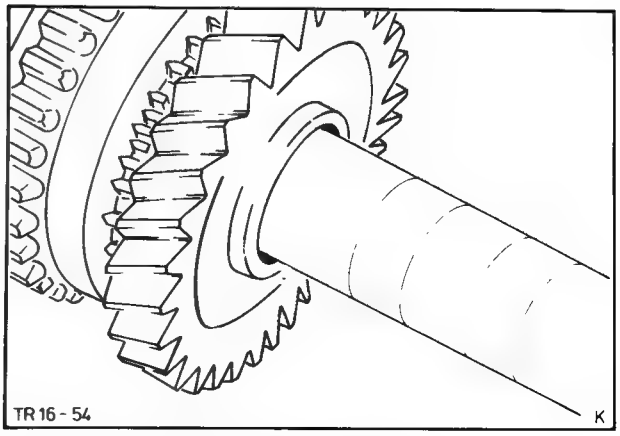


Fig. 83. 1st gear and synchroniser ring fitted

24. Fit oil scoop ring with oil groove facing the gear, Fig. 84.

    NOTE: Make sure guide groove is located correctly.

25. Insert ball bearing in retainer.

    NOTE: Coat bearing seat in retainer with multi-purpose grease.

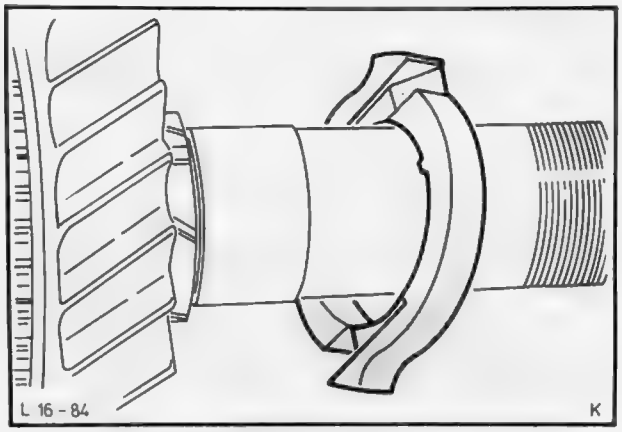


Fig. 84. Oil scoop ring with oil groove facing gear

26. Press bearing and retainer into place using a suitable piece of tubing.

27. Fit spacer sleeve, insert interlock ball and slide on speedometer worm gear, Fig. 85.

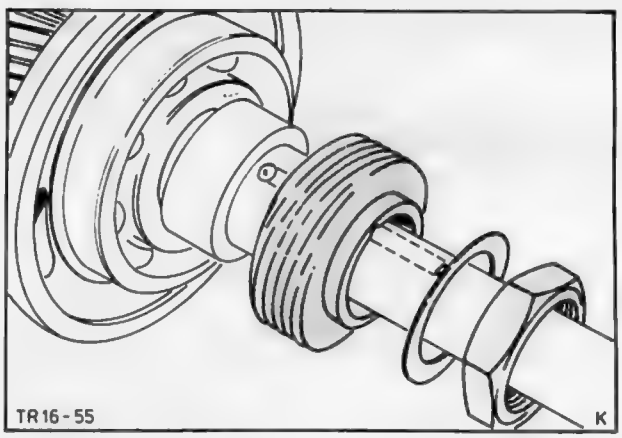


Fig. 85. Fit spacer sleeve with speedometer worm gear

28. Insert lock washer with tabs in recess in speedometer worm .gear. Tighten mainshaft nut to specified torque with Special Tool No. 16–027 and lock, Fig. 86.

    NOTE: Bend tabs of washer for mainshaft nut at 90° to inner teeth.

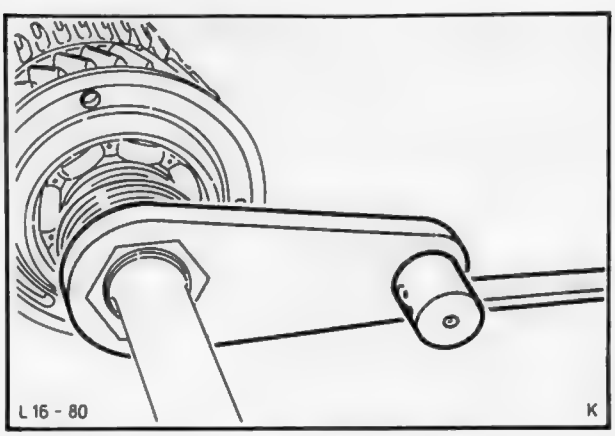


Fig. 86. Torque nut to specified value with Special Tool No. 16–027

29. Fit 3rd gear with synchroniser ring and engage 3rd/4th gear synchroniser hub, then press into place using a suitable piece of tube and fit circlip.

    NOTE: Fit 3rd/4th gear synchroniser hub with the peripheral groove on the sliding gear facing the rear, Fig. 87.

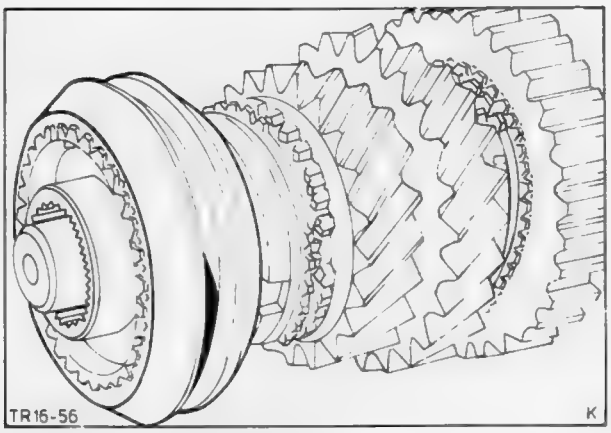


Fig. 87. Synchroniser hub fitted

Overhaul Input Shaft and Countershaft Gear Train

30. Remove circlips from input shaft and ball bearing, Fig. 88. Then press ball bearing off input shaft.

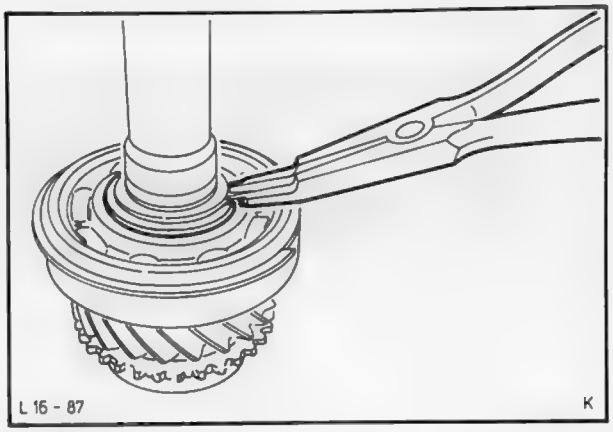


Fig. 88. Remove circlips

31. Press ball bearing onto input shaft, Fig. 89. and fit circlips to bearing and input shaft.

    NOTE: Coat bearing seat with multi-purpose grease before fitting.

32. Remove dummy shaft from countershaft gear train and take out in each case 22 needle rollers with the spacer shims (2 each) at both ends of the countershaft gear train.

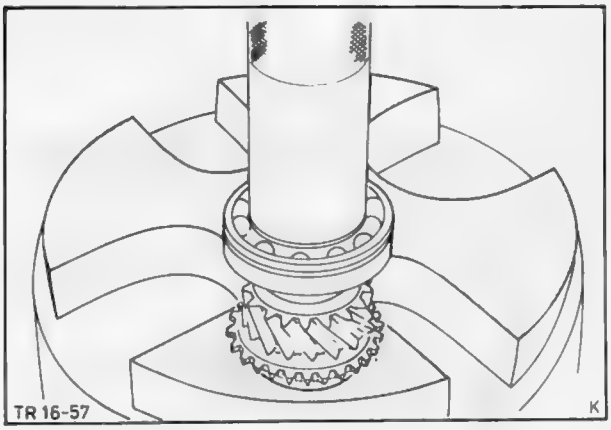


Fig. 89. Fit input shaft bearing

33. Reassemble countershaft gear train: insert dummy shaft, fit spacer shim, 22 needle rollers and then another spacer shim, turn countershaft gear train carefully and fit a further 22 needle rollers with a spacer shim on either side, Fig. 90.

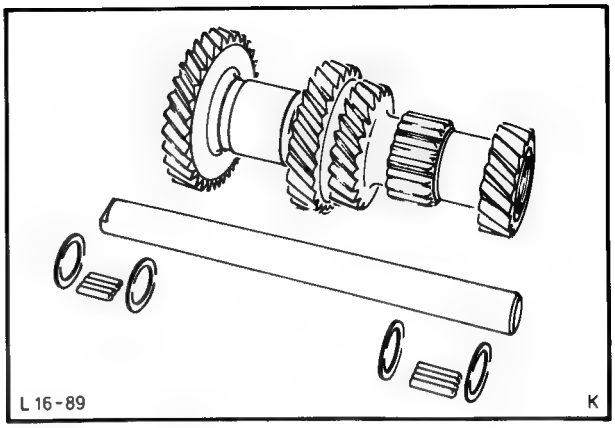


Fig. 90. Countershaft gear train with shaft, spacer shims and needle rollers

34. Remove oil seal from main drive gear bearing retainer.

35. Using a suitable piece of tube, carefully insert new oil seal into main drive gear bearing retainer so that the sealing lip points towards the gearbox casing when installed, Fig. 91.

NOTE: Coat sealing lip with multi-purpose grease.

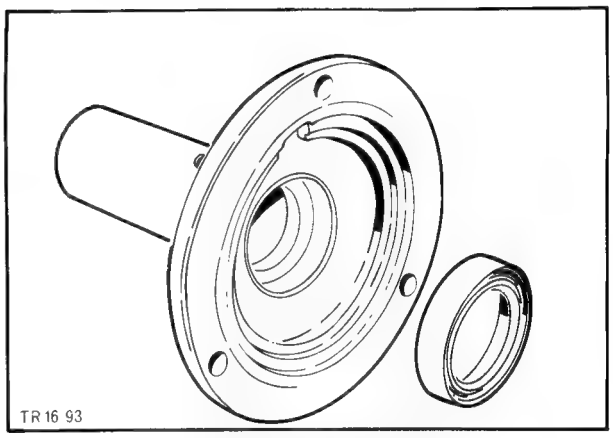


Fig. 91. Main drive gear bearing retainer installed

To Reassemble Gearbox

Remove gearbox filler plug from casing, clean all parts thoroughly and lightly lubricate with the specified gearbox oil before assembling.

Bolts in contact with the oil chamber of the gearbox must be coated with sealing compound when inserted.

36. Fit reverse idler gear with selector groove pointing to the rear. Insert shaft and tap in with a copper hammer until only the flat end of the shaft projects.

Rear flat end must line up on countershaft bore, Fig. 92.

NOTE: Coat shaft with grease S-M1C-4505A.

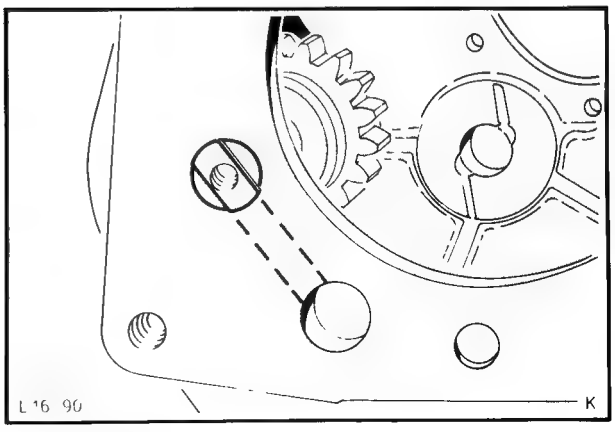


Fig. 92. Position of reverse gear shaft when fitted

37. Stick countershaft gear train thrust washers to recess in the casing with grease, Fig. 93.

Tabs of thrust washers must face the casing when fitted – large thrust washer at the front.

38. Carefully insert countershaft gear train with dummy shaft 16 003 in casing and lower.

NOTE: Thrust washers must not be moved during this operation.

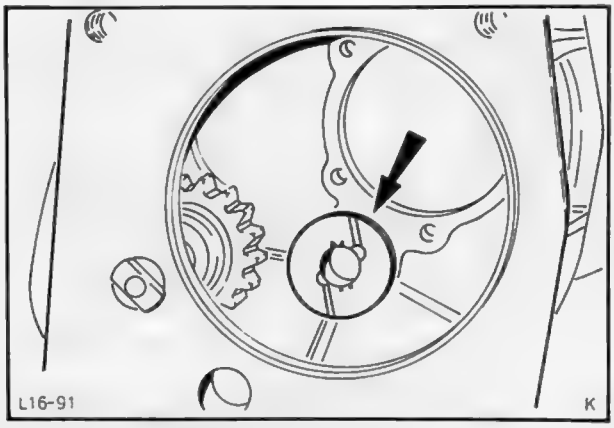


Fig. 93. Stick thrust washers of countershaft gear train in casing

39. Insert input shaft with bearing into gearbox casing until circlip abuts.

40. Fit main drive gear bearing retainer with a new gasket.

NOTE: Oil return port must line up with hole in gasket and bearing retainer, Fig. 94. When installing bearing retainer, bind splining of input shaft (with adhesive tape or similar) to prevent damage to oil seal. Then coat the bolts with sealing compound and insert.

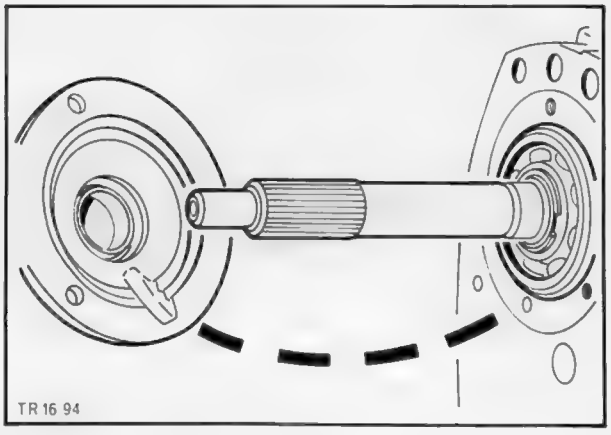


Fig. 94. Line up oil return ports

41. Lubricate needle rollers and insert around input shaft. Slide synchroniser ring over the cone on the input shaft.

42. Insert complete mainshaft in gearbox casing, Fig. 95.

NOTE: Extension housing gasket must be fitted on gearbox casing before mainshaft is installed.

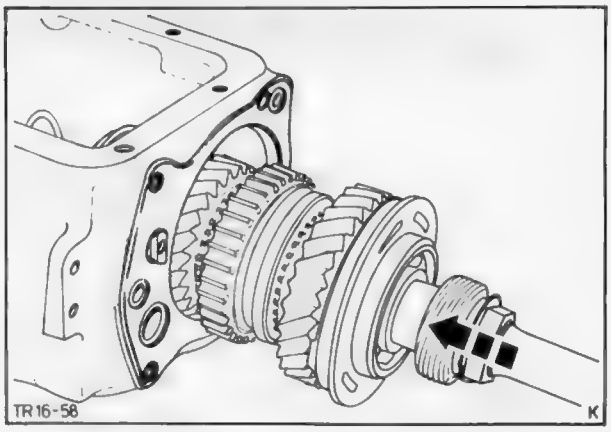


Fig. 95. Fit mainshaft

43. Turn gearbox through 180° until countershaft gear train meshes with mainshaft and input shaft. Then line up countershaft gear train with bores in the casing, taking care not to disturb the thrust washers. Push in countershaft from the rear of the casing, keeping it in constant contact with the dummy shaft 16–003, and tap in flush with a copper hammer. Remove dummy shaft.

    NOTE: The flat end of the shaft must point along the recess for the reverse gear shaft.

    Then turn gearbox casing back to original position.

44. Line up bearing retainer hole with the guide pin in the extension housing, Fig. 96.

45. Fit extension housing (4 bolts).

    NOTE: Coat bolts with sealing compound, insert and torque as specified.

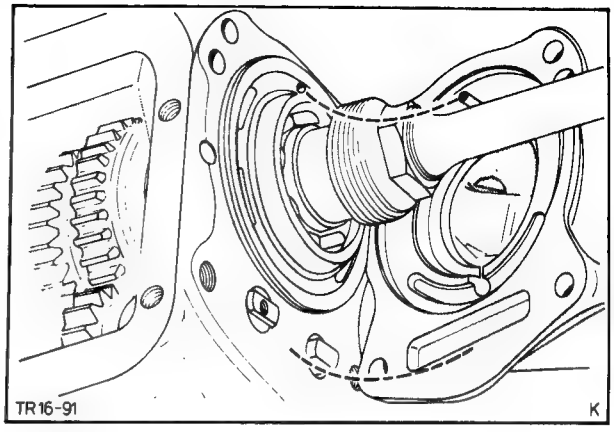


Fig. 96. Line up bearing retainer hole with guide pin

46. Press in new extension housing bush with Special Tool No. 16–016, Fig. 97.

    The bush must be installed so that the oil return groove sits in the extension housing at the bottom and to the rear, thereby ensuring that the gap (notch) in the bush is not located over the oilway.

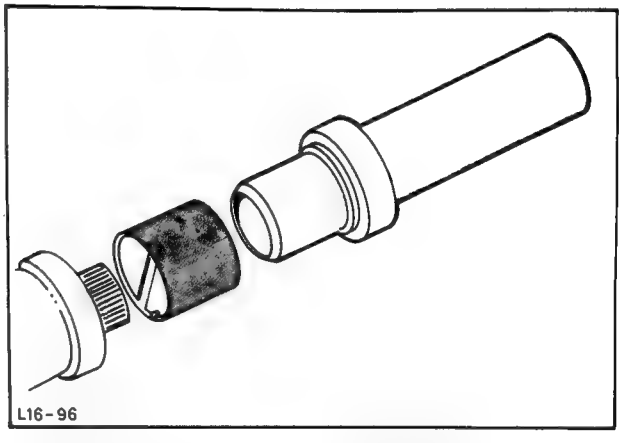


Fig. 97. Fit extension housing bush with Special Tool No. 16–016

47. Fit new extension housing oil seal with Special Tool No. 16–016, Fig. 98.

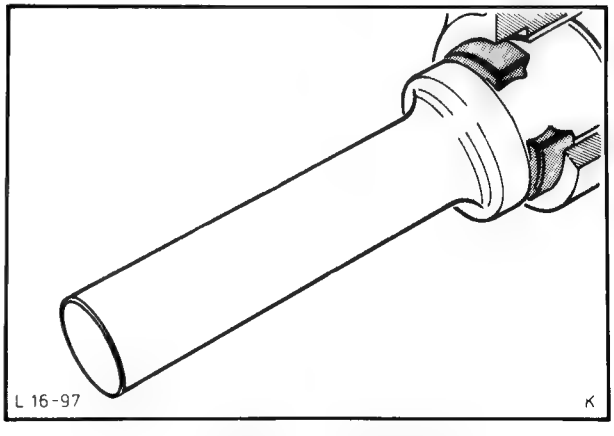


Fig. 98. Fit oil seal with Special Tool No. 16–016

48. Fit speedometer drive gear with a new O-ring, Fig. 99.

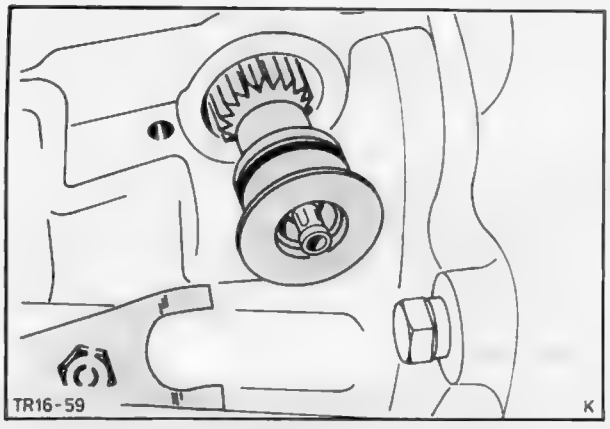


Fig. 99. Fit speedometer drive gear

49. Fit selector housing with selector forks and secure, Fig. 100.

    NOTE: Use new gasket for selector housing.

50. Detach gearbox from stand and remove Special Tool No. 16–009.

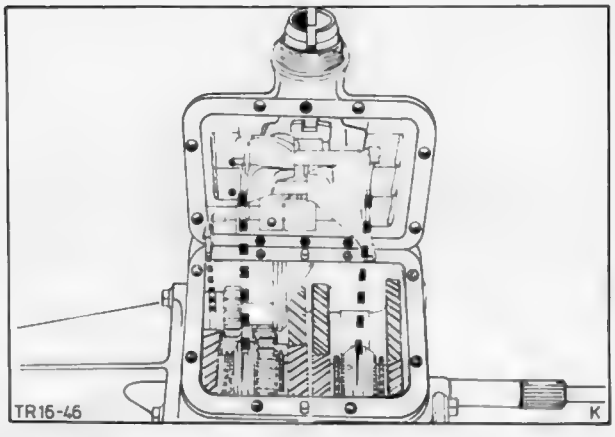


Fig. 100. Fit selector housing

51. Install clutch thrust bearing and release lever in clutch housing, Fig. 101.

52. Attach clutch housing to gearbox casing.

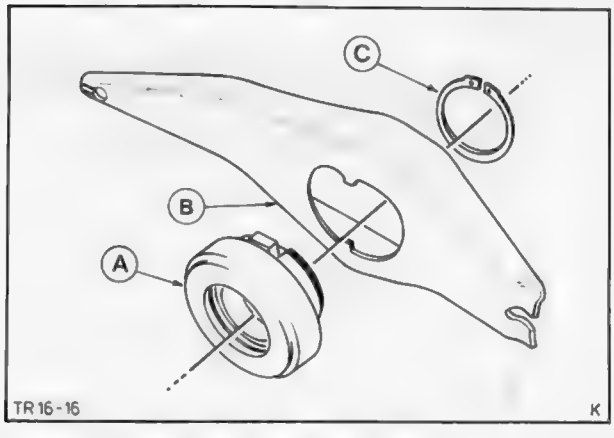


Fig. 101. Fit release lever with thrust bearing
A – Thrust bearing
B – Release lever
C – Circlip

16 134 5 PILOT BEARING – REMOVE AND INSTALL (Clutch pressure plate removed)

Special Service Tools Required:

Flywheel bearing remover	21–036
Clutch plate locator and flywheel bearing replacer	21–080/21–004

To Remove

1. Locate side arms of Special Tool No. 21–036 behind the pilot bearing and withdraw the bearing by tightening the nut, Fig. 102.

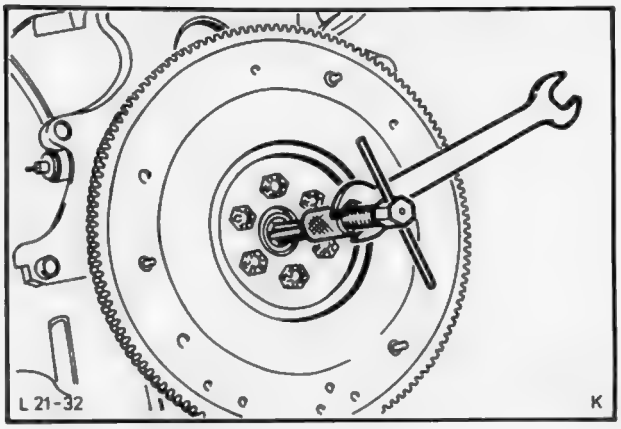


Fig. 102. Remove pilot bearing with Special Tool No. 21–036

To Replace

2. Press new pilot bearing into crankshaft flange with Special Tool No. 21–044/21–080, Fig. 103.

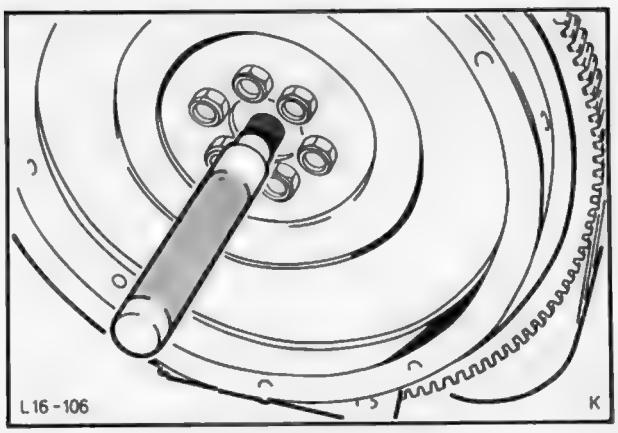


Fig. 103. Fit pilot bearing with Special Tool No. 21–044/21–080

16 164 BUSH – EXTENSION HOUSING – REPLACE

Special Service Tools Required:

Extension housing bush remover	16–011/16–025
Extension housing bush and oil seal installer	16–015/16–016
Extension housing oil seal remover	17–001

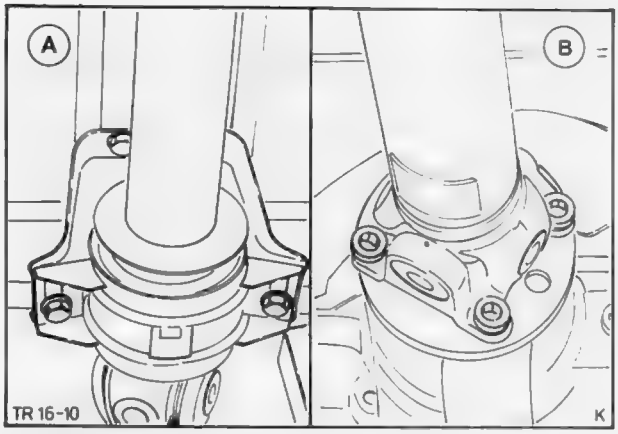


Fig. 104. Driveshaft mountings – rear axle flange and centre bearing
A – Centre bearing
B – Rear axle flange

To Remove

1. Drive vehicle over a pit or onto a ramp and detach driveshaft from rear axle flange (4 bolts), Fig. 104.
2. Disconnect driveshaft centre bearing (2 bolts), Fig. 104. Draw shaft complete from extension housing, placing oil tray underneath.

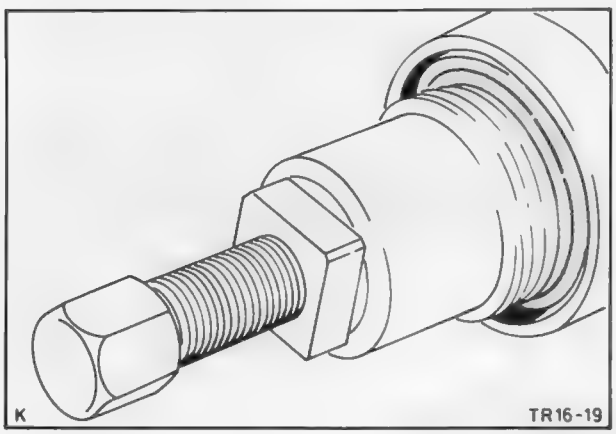


Fig. 105. Remove extension housing oil seal with Special Tool No. 17–001

3. With the centre spindle wound out, screw tool 17–001 into oil seal until firmly held, Fig. 105. Extract seal by screwing spindle in, holding tool firmly with an open-ended spanner.
4. Remove extension housing bush with Special Tool No. 16–011/16–025, Fig. 106.

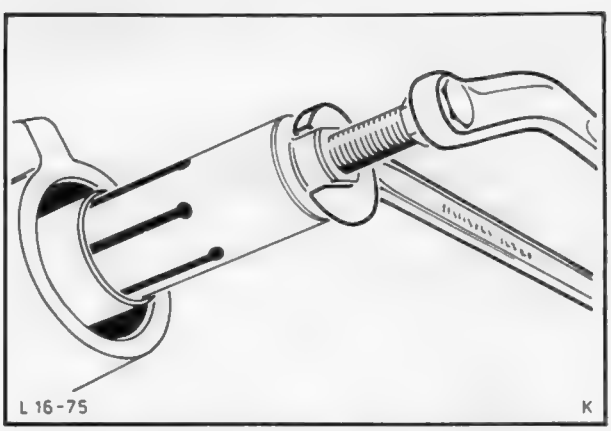


Fig. 106. Extract extension housing bush with Special Tool No. 16–011/16–025

To Replace

5. Press in new extension housing bush with Special Tool No. 16–015/16–016, Fig. 107.

   Bush must be installed so that the oil return groove sits in the extension housing at the bottom and to the rear, thereby ensuring that the gap (notch) in the bush is not located over the oilway.

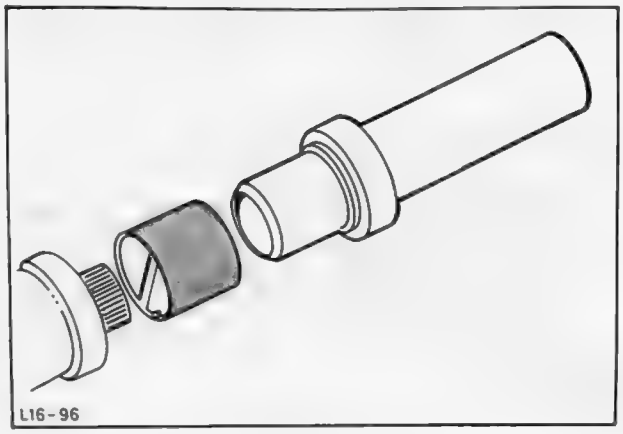


Fig. 107. Fit extension housing bush with Special Tool No. 16–015/16–016

6. Fit new oil seal in extension housing using Special Tool No. 16–015/16–016, Fig. 108.
7. Insert driveshaft in extension housing and engage with splining on gearbox mainshaft, taking care not to damage extension housing oil seal. Then attach driveshaft centre bearing to floor pan so that it is free of strain.

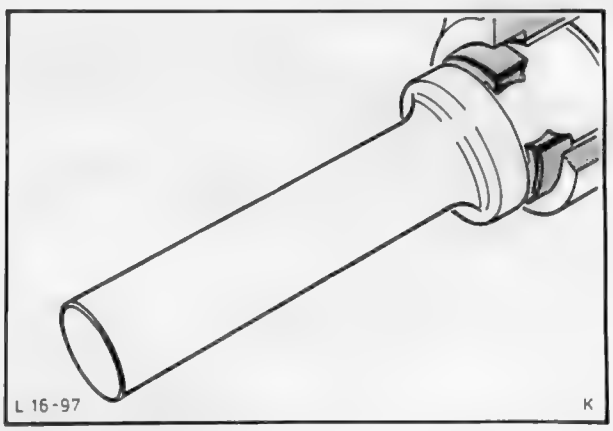


Fig. 108. Fit oil seal with Special Tool No. 16–015/16–016

8. Attach driveshaft to rear axle flange with bolts and new spring washers and torque as specified, Fig. 109.
9. Torque centre bearing bolts as specified, Fig. 109.
10. Check gearbox oil level, top up with specified oil if necessary.

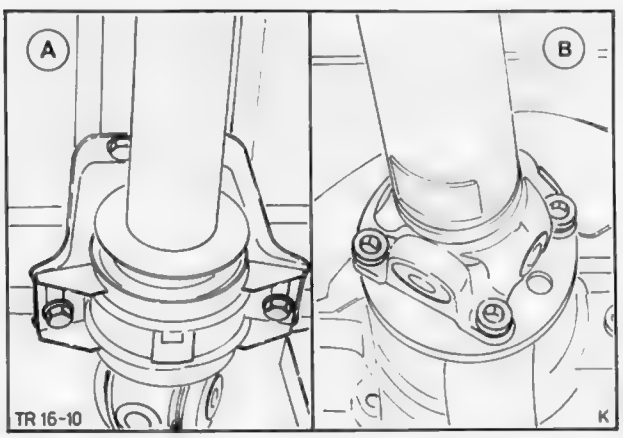


Fig. 109. Driveshaft mountings – rear axle flange and centre bearing
A – Centre bearing
B – Rear axle flange

16 172 GEAR – SPEEDOMETER DRIVEN – REMOVE AND INSTALL

Special Service Tools Required: None

To Remove

1. Drive vehicle over pit or onto a ramp.

2. Remove bolt (1) with speedometer cable bracket and detach cable (G gearbox), Fig. 110. Slacken knurled nut of speedometer drive unit, detach cable and unscrew complete drive unit from extension housing (F gearbox), Fig. 111.

   NOTE: Catch oil.

3. Pull out speedometer drive unit (bearing and drive gear) (G gearbox).

4. Detach bearing from drive gear and check for signs of wear or scoring.

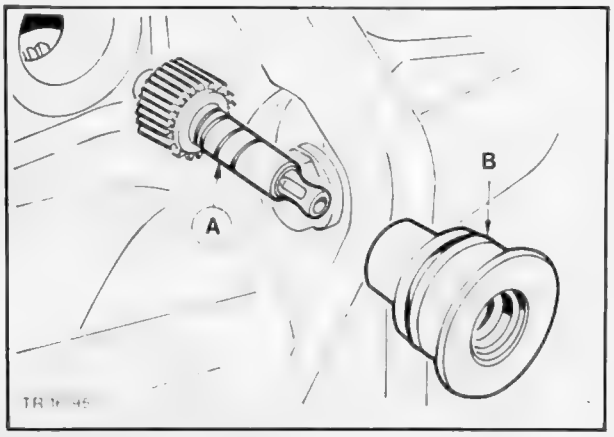


Fig. 110. Speedometer drive unit removed (G gearbox)
A – Drive pinion
B – Drive pinion bearing

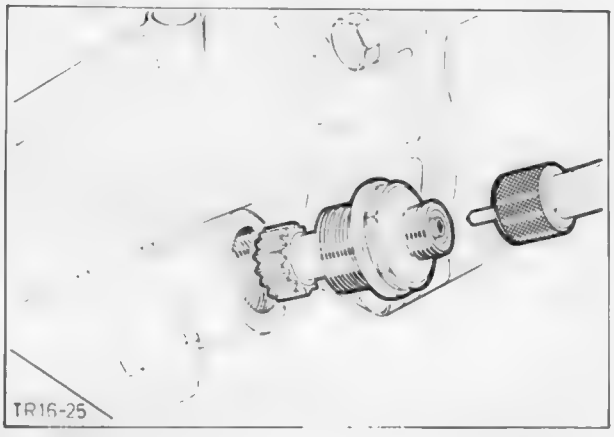


Fig. 111. Speedometer drive unit removed (F gearbox)

To Install

5. Lubricate and slide drive gear into bearing. Check that it turns freely.

6. Replace bearing and drive gear or complete speedometer drive unit in extension housing. Then attach bolt and bracket (G gearbox). Screw in complete speedometer drive unit, coating thread with sealing compound (F gearbox).

   NOTE: In G gearbox replace O-ring if necessary.

7. Connect speedometer cable.

8. Check oil level in gearbox and top up with specified oil if necessary, Fig. 112.

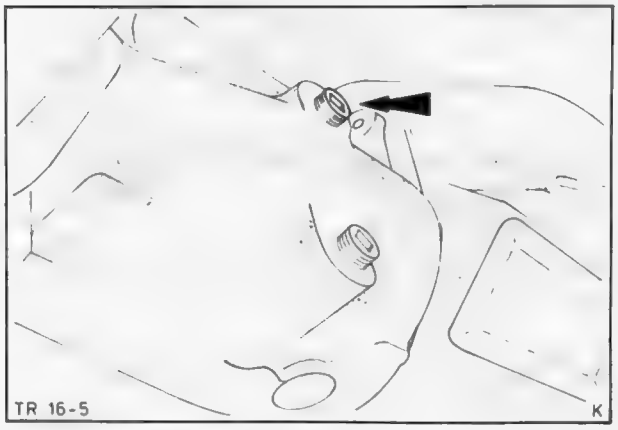


Fig. 112. Check oil level

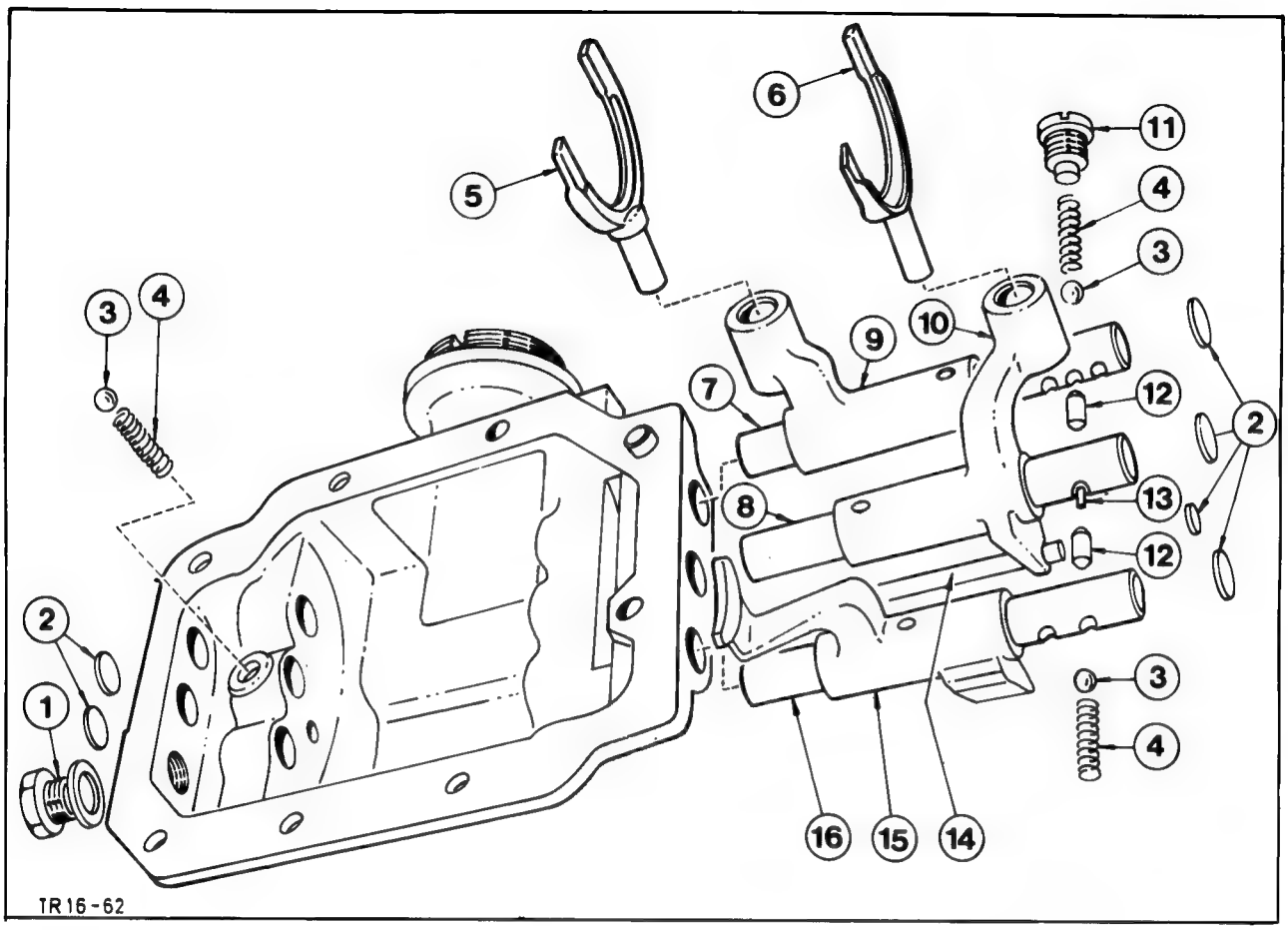


Fig. 113

1. Plug with seal or reversing lamp switch
2. Blanking disks
3. Interlock ball
4. Spring
5. 1st/2nd gear selector fork
6. 3rd/4th gear selector fork
7. 1st/2nd gear selector rail
8. 3rd/4th gear selector rail
9. 1st/2nd gear fork carrier
10. 3rd/4th gear fork carrier
11. Selector detent plug
12. Interlock plunger
13. Interlock pin
14. Fork guide rod
15. Reverse gear selector fork
16. Reverse gear selector rail

16 264 8 SELECTOR HOUSING – OVERHAUL (Selector housing removed)

Special Service Tools Required: None

To Dismantle

1. Remove threaded plug of selector detent. Take out spring and ball, Fig. 114.

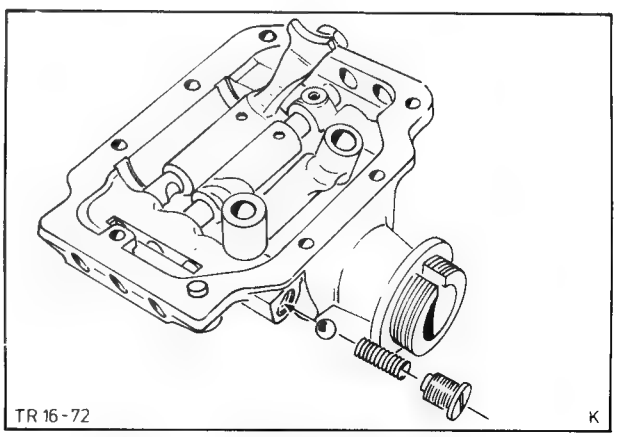


Fig. 114. Selector detent mechanism exploded

2. Detach blanking disks and threaded plug or reversing lamp switch from selector housing, Fig. 115.

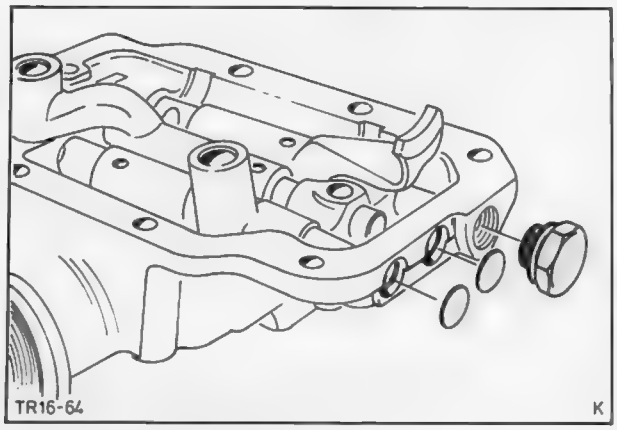


Fig. 115. Detach blanking disks and plug from selector housing

3. Drive all locking pins from selector rails, Fig. 116.

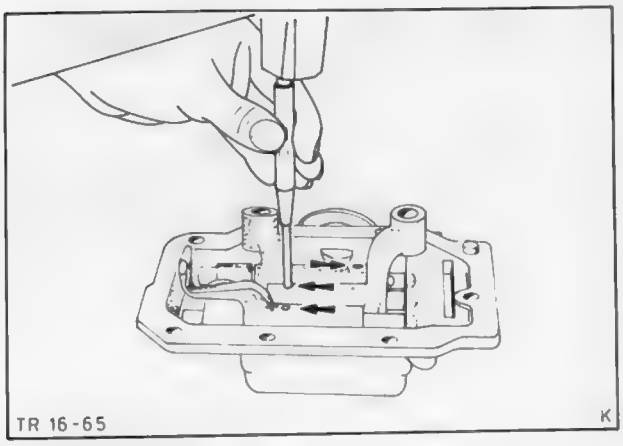


Fig. 116. Remove locking pins

4. Remove 1st/2nd gear selector rail and selector fork carrier, Fig. 117.

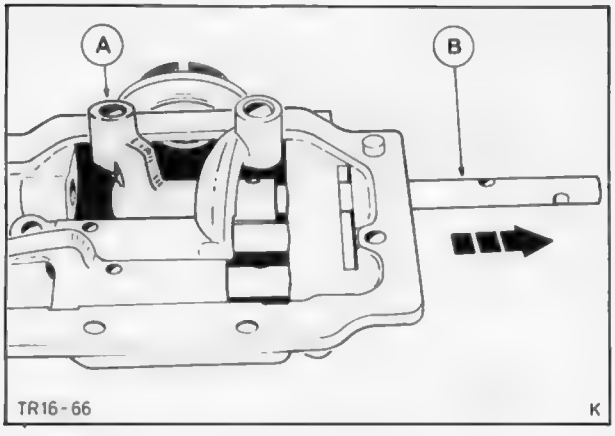


Fig. 117. Remove 1st/2nd gear selector rail
A – Selector fork carrier
B – Selector rail

5. Remove 3rd/4th gear selector rail and selector fork carrier, Fig. 118.

   Watch out for ball and spring.

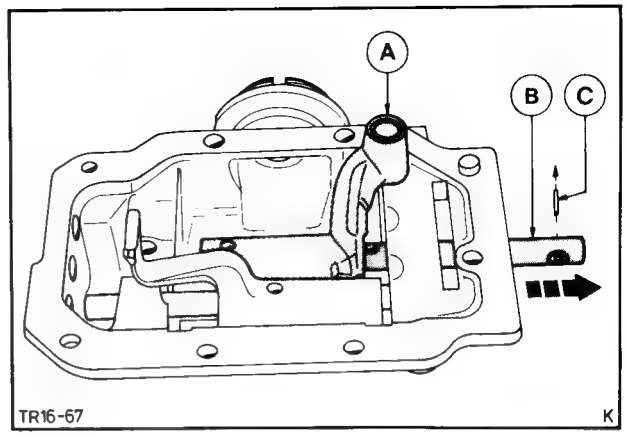


Fig. 118. Remove 3rd/4th gear selector rail
A – Selector fork carrier
B – Selector rail
C – Interlock pin

6. Remove plungers and take out reverse gear selector rail and selector fork, Fig. 119.

   Remove ball and detent spring.

7. Remove selector fork guide rod.

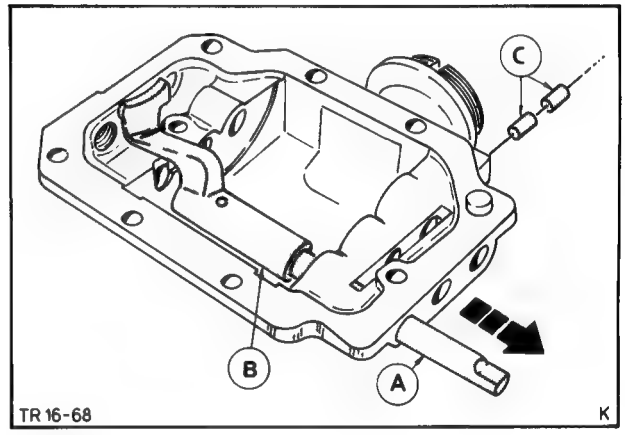


Fig. 119. Remove reverse gear selector rail and selector fork
A – Selector rail
B – Selector fork carrier
C – Interlock plungers

To Reassemble

8. Refit selector fork guide rod, Fig. 120.
9. Fit reverse gear selector rail and fork, first inserting spring and ball, Fig. 120, and then pressing down until selector rail can be slid in.

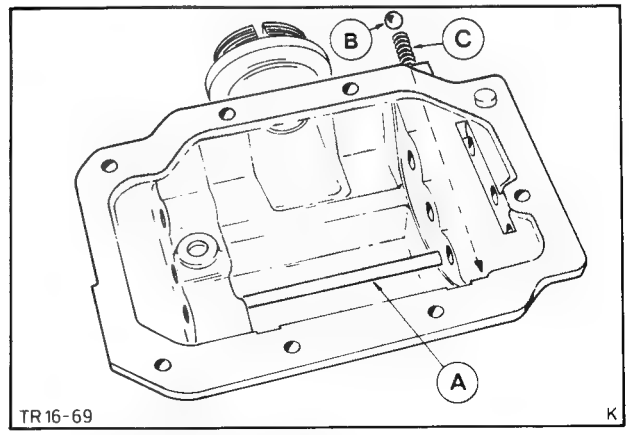


Fig. 120. Selector fork guide rod fitted
A – Guide rod
B – Interlock ball
C – Spring

10. Fit 3rd/4th gear selector rail and fork carrier in the manner described in sub-operation 9. In addition the interlock pin also has to be inserted in the hole in 3rd/4th gear selector rail together with the interlock plunger for reverse and 3rd/4th gear selector rails, Fig. 121.

11. Fit 1st/2nd gear selector rail and fork carrier, insert interlock plunger between 3rd/4th gear and 1st/2nd gear selector rails then press in selector rail.

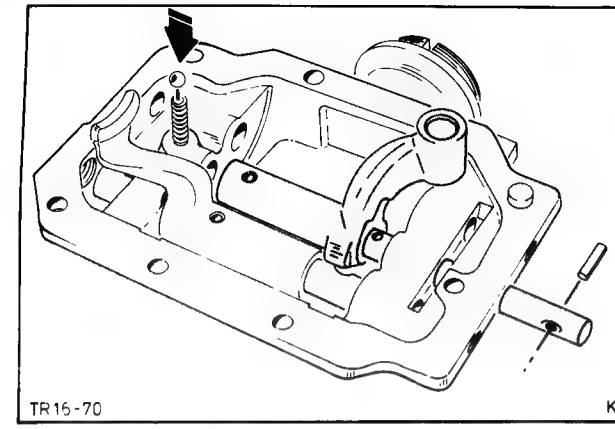


Fig. 121. Fit 3rd/4th gear selector rail and fork carrier

12. Secure all the selector rails and fork carriers with locking pins, Fig. 122.

13. Fit blanking disks and threaded plug or reversing lamp switch in selector housing.

    NOTE: Apply sealing compound when fitting blanking disks.

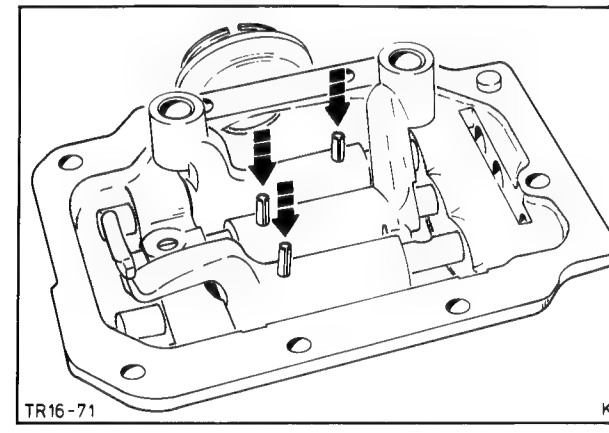


Fig. 122. Secure selector rails and fork carriers with locking pins

14. Insert spring and ball of 1st/2nd gear selector rail and screw in selector detent plug.

    Always bring all selector rails to neutral position after installing, Fig. 123.

    NOTE: Sealing compound must be applied when screwing in plug.

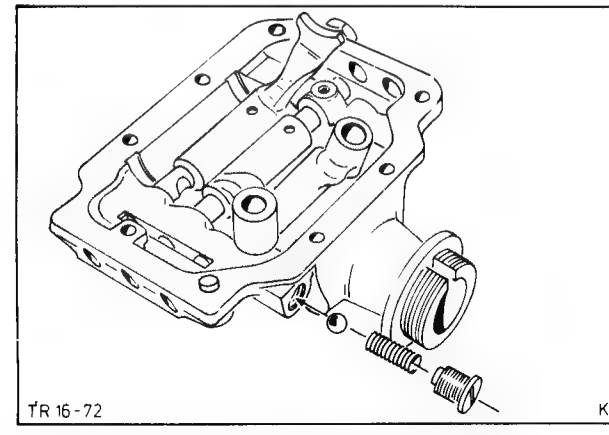


Fig. 123. Insert spring and ball of 1st/2nd gear selector rail

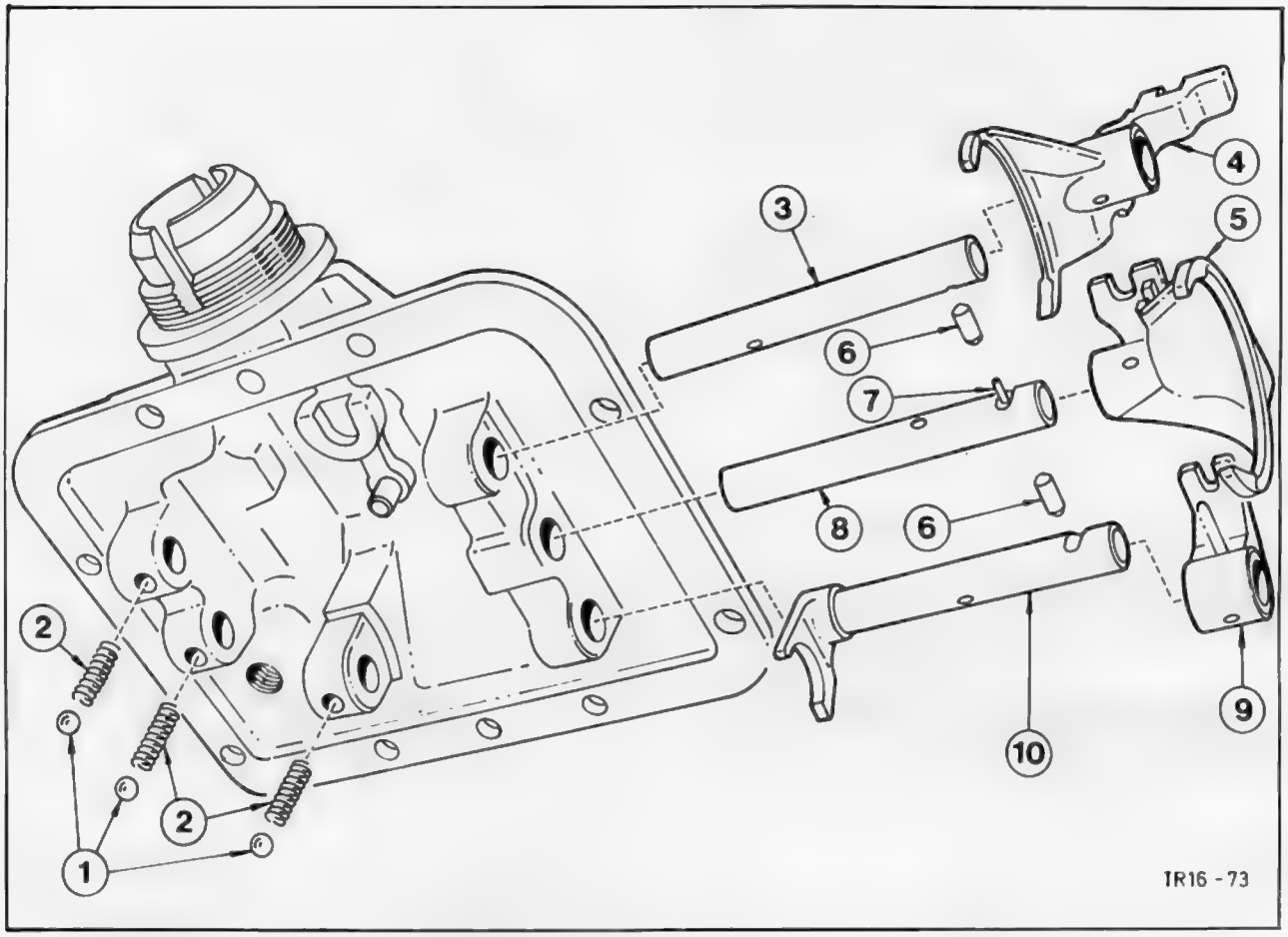


Fig. 124.

1. Interlock ball
2. Spring
3. 1st/2nd gear selector rail
4. 1st/2nd gear selector fork
5. 3rd/4th gear selector fork
6. Interlock plunger
7. Interlock pin
8. 3rd/4th gear selector rail
9. Reverse gear selector dog
10. Reverse gear selector rail with fork

16 264 8 SELECTOR HOUSING – OVERHAUL (Selector housing removed)

Special Service Tools Required: None

To Dismantle

1. Remove locking pin from 1st/2nd gear selector fork and rail. Then drive rail out from one side and detach selector fork. Watch out for ball and spring, Fig. 125.
2. Remove 3rd/4th gear selector fork and rail (as described in sub-operation 1). Here again watch out for ball, spring and interlock pin.

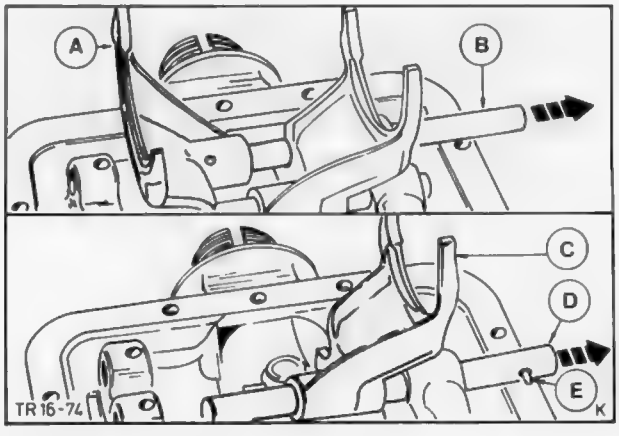


Fig. 125 A – 1st/2nd gear selector fork
B – 1st/2nd gear selector rail
C – 3rd/4th gear selector fork
D – 3rd/4th gear selector rail
E – Interlock pin

3. Remove reverse gear selector rail and fork, Fig. 126. (See sub-operation 1 for procedure).

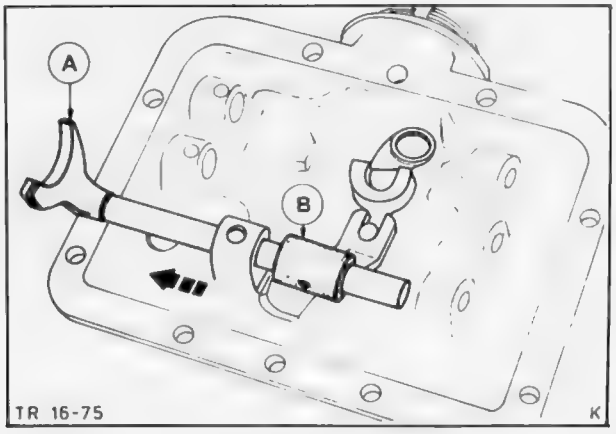


Fig. 126. A – Remove reverse gear selector fork and rail
B – Reverse gear selector dog on rail

4. Take out selector rail interlock plungers by turning selector housing on its side, Fig. 127.

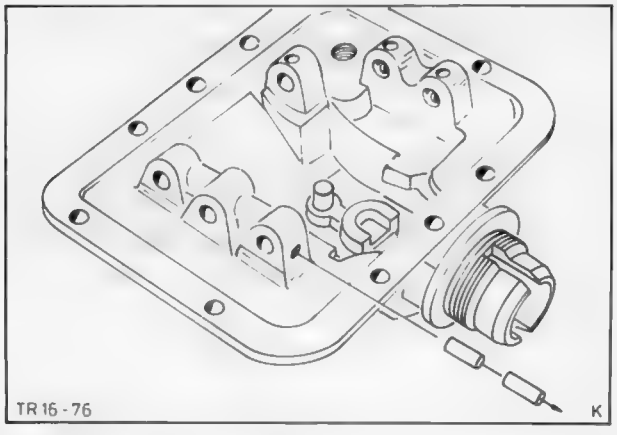


Fig. 127. Remove selector rail plungers (turn selector housing on its side)

To Reassemble

5. Fit reverse gear selector fork and rail. To do this, insert spring and ball and press down until selector rail can be pushed in, Fig. 128.

   NOTE: Insert selector fork so that the holes for the locking pin line up. Tap in locking pin.

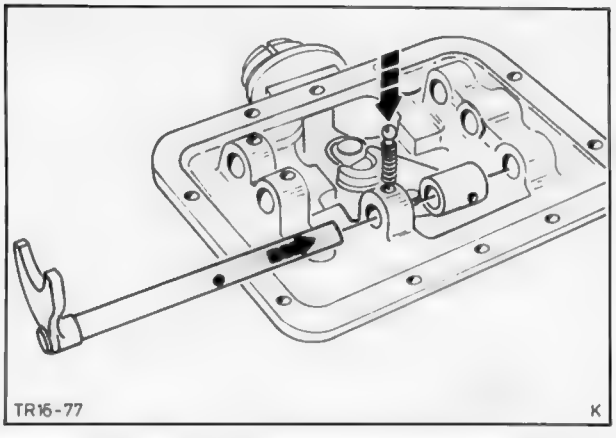


Fig. 128. Fit reverse gear selector fork and rail (fit ball and spring at same time)

6. Insert interlock plunger between reverse gear and 3rd/4th gear selector rails.
7. Fit 3rd/4th gear selector fork and rail, Fig. 129.
(Install as described in sub-operation 5, noting that the interlock pin also has to be inserted in the hole in the selector rail.)

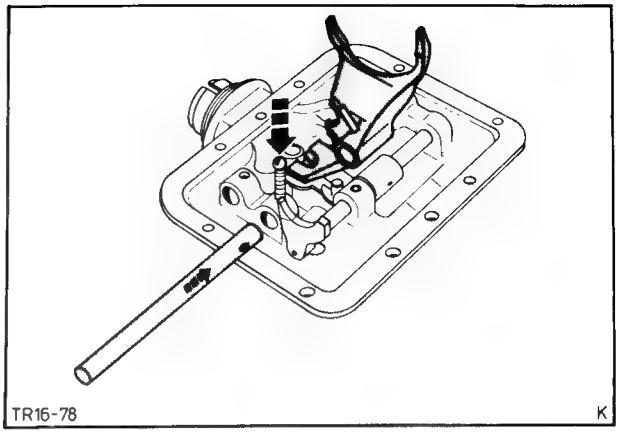


Fig. 129. Fit 3rd/4th gear selector fork and rail

8. Insert interlock plunger between 3rd/4th gear and 1st/2nd gear selector rails, Fig. 130.

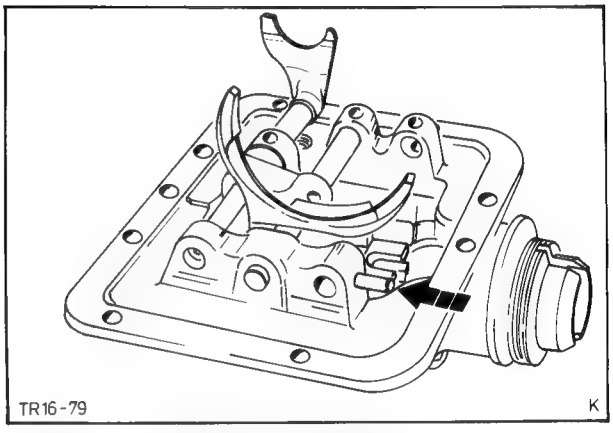


Fig. 130. Insert interlock plunger between 3rd/4th gear and 1st/2nd gear selector rails

9. Fit 1st/2nd gear selector fork and rail, Fig. 131.
(Install as described in sub-operation 5.)

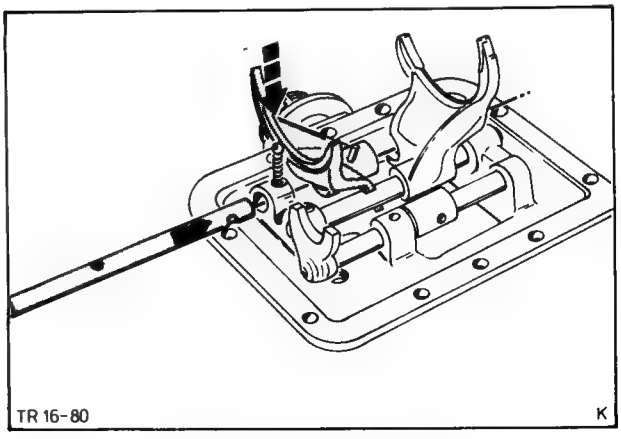


Fig. 131. Fit 1st/2nd gear selector fork and rail

16 724 4 CLUTCH DISC AND PRESSURE PLATE – REMOVE AND INSTALL (Engine or gearbox removed)

Special Service Tools Required:

Clutch plate installer and aligner 21–080/21–044

To Remove

1. Release clutch pressure plate from flywheel, slackening the 6 bolts evenly, and remove, Fig. 132. Detach pressure plate and clutch disc.

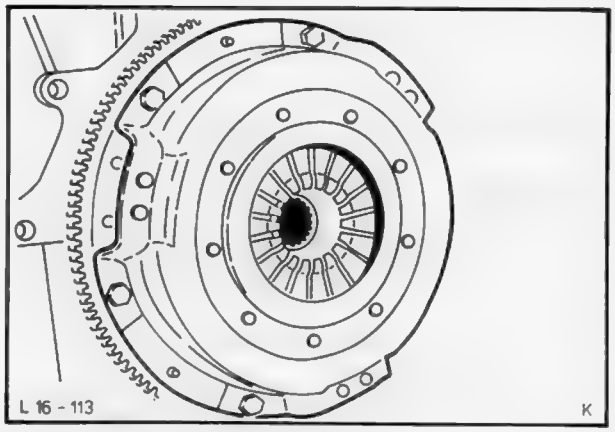


Fig. 132. Remove clutch pressure plate

To Install

2. Locate pressure plate and clutch disc on flywheel with Special Tool 21–044/21–080, ensuring that flat side of clutch disc faces the flywheel, Fig. 133.
3. Secure pressure plate, tightening bolts evenly corner to corner to specified torque.
4. Remove centering tool 21–044/21–080.

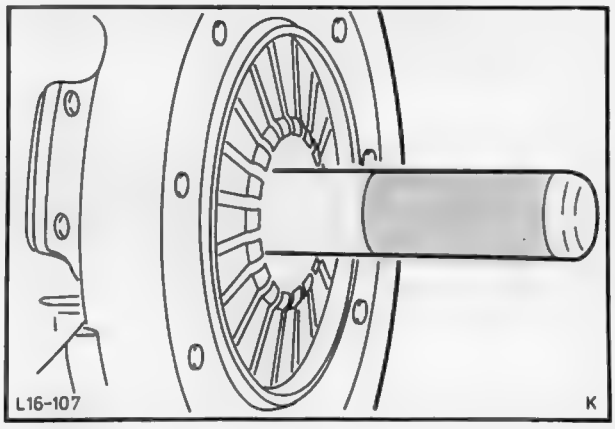


Fig. 133. Fit pressure plate and clutch disc using centering tool 21–044/21–080

16 756 4 LININGS – CLUTCH DISC – REPLACE (Clutch disc removed)

Special Service Tools Required: None

To Remove

1. Detach clutch disc lining. **Drill out rivet heads carefully so as not to damage clutch disc, Fig. 134.**

To Replace

2. Rivet on clutch disc linings. **Rivet linings one at a time corner to corner. Only use hollow flat-head rivets.**

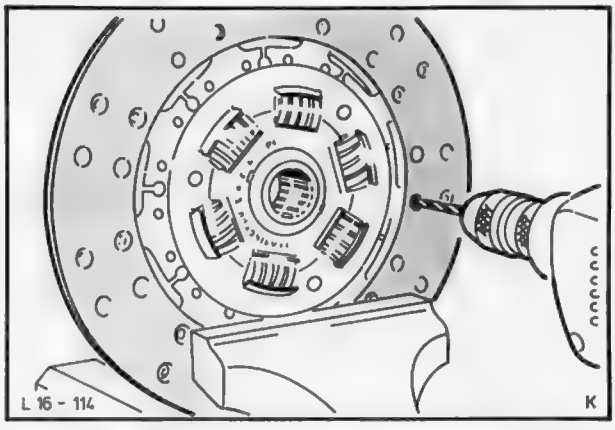


Fig. 134. Drill out rivets of clutch disc linings

16 524 GEAR LEVER – REMOVE AND INSTALL

Special Service Tools Required: None

To Remove

1. Unscrew gear lever knob by hand.

2. Remove cover plate (6 screws), Fig. 135.

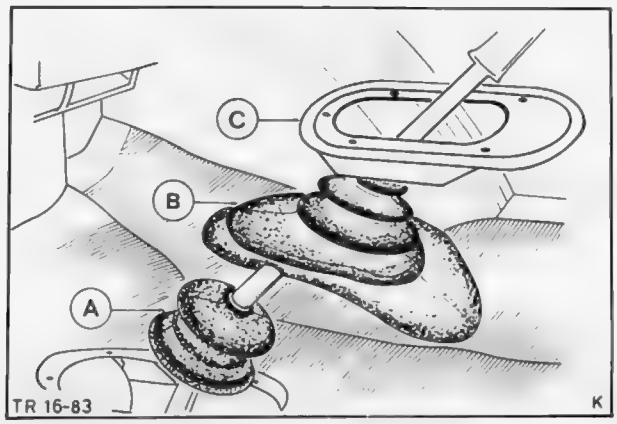


Fig. 135. A – Bottom rubber gaiter
B – Top rubber gaiter
C – Cover plate

3. Remove rubber gaiter and plastic cap from underneath, take out gear lever assembly complete, Fig. 136.

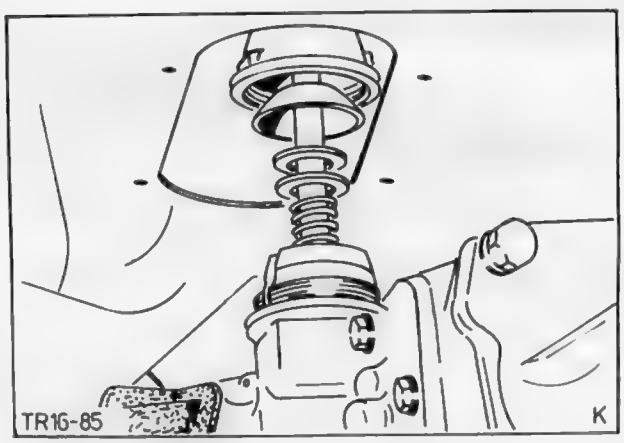


Fig. 136. Take out complete gear lever assembly

To Install

4. Insert gear lever and attach plastic cap from underneath, Fig. 137.

5. Slide new rubber gaiters onto gear lever with the aid of glycerine. Then fold bottom rubber gaiter over the plastic cap.

6. Fit cover plate with top gaiter.

7. Screw on gear lever knob.

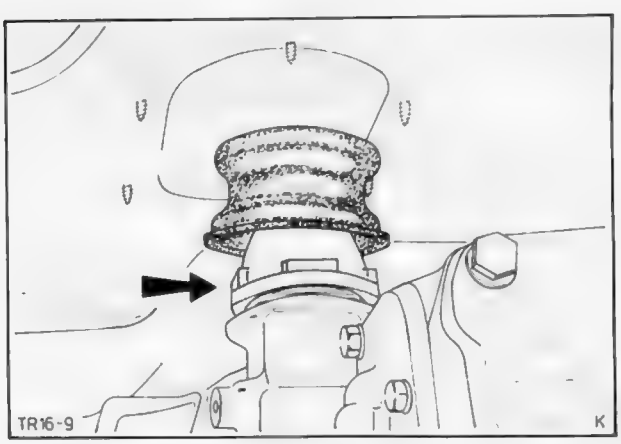


Fig. 137. Fit gear lever assembly

16 812 CLUTCH PEDAL – REMOVE AND INSTALL

Special Service Tools Required: None

To Remove

1. Slacken clutch operating cable, unhook return spring and detach retaining clip from pedal shaft, Fig. 138.

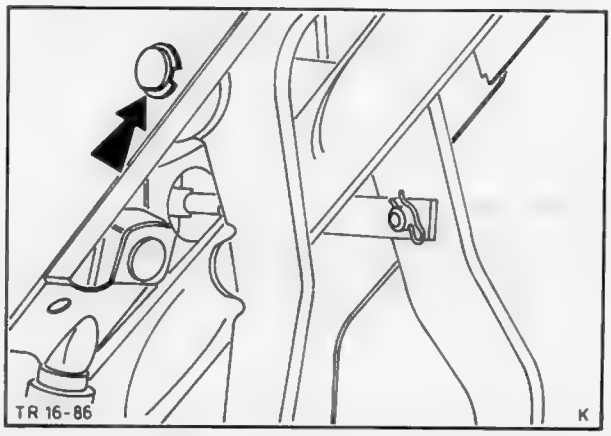


Fig. 138. Clutch pedal shaft retaining clip

2. Slide pedal shaft along until clutch pedal can be pulled out of pedal bracket. Press retaining pin in clutch pedal out of the plastic yoke and remove. Disconnect clutch cable, Fig. 139.

   Detach clutch pedal with bushes.

3. Replace clutch pedal bushes.

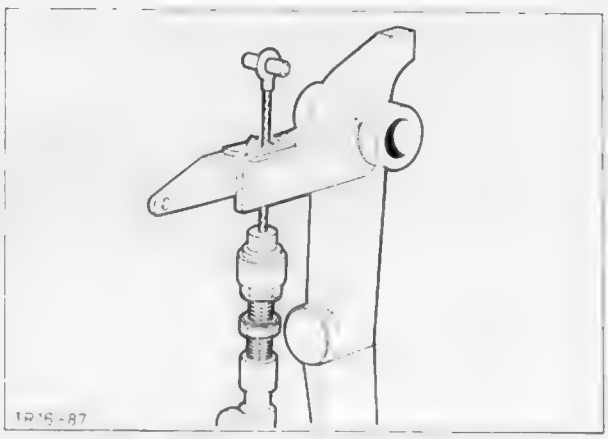


Fig. 139. Disconnect clutch cable

To Install

4. Slide clutch pedal, fitted with new bushes, into pedal bracket, Fig. 140, and connect the clutch cable. Attach return spring. Then hold pedal in line with opening and slide pedal shaft back as far as stop.

   NOTE: Coat pedal shaft and bushes with molybdenum disulphide grease.

5. Attach pedal shaft retaining clip.

6. Check clutch pedal play and adjust as specified.

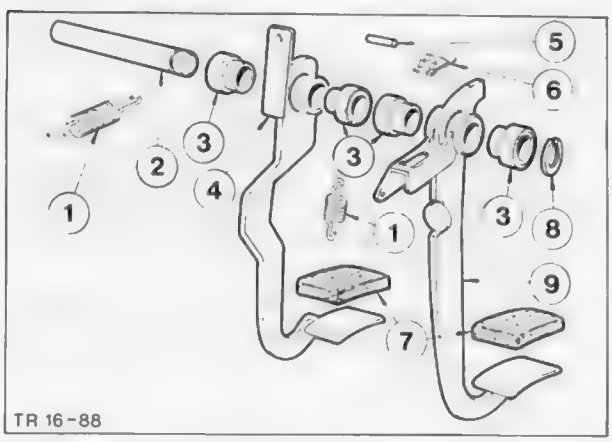


Fig. 140. Clutch mechanism exploded

1. Return spring	4. Brake pedal	7. Pedal rubber
2. Shaft	5. Retaining pin	8. Circlip
3. Bush	6. Yoke	9. Clutch pedal

16 814 CABLE – CLUTCH OPERATING – REMOVE AND INSTALL

Special Service Tools Required: None

To Remove

1. Drive vehicle over a pit or onto a ramp.
2. Slacken clutch cable at pedal mounting, Fig. 141.

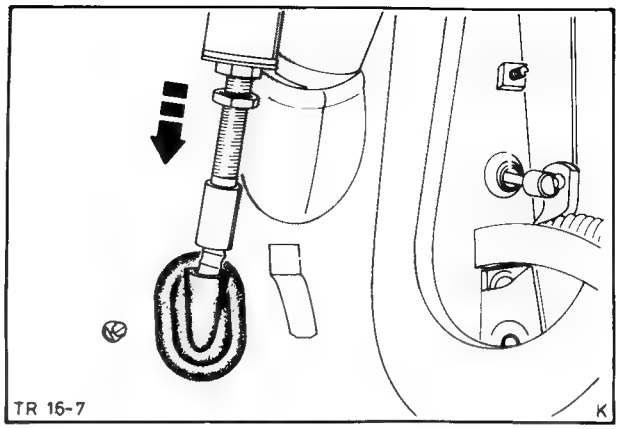


Fig. 141. Slacken clutch cable at pedal

3. Detach clutch cable from clutch pedal by removing retaining pin from cable yoke.
4. Pull out rubber gaiter on clutch release lever, disconnect cable from lever, Fig. 142. Detach gaiter. Press rubber cable seal out of bulkhead panel and remove clutch cable complete.

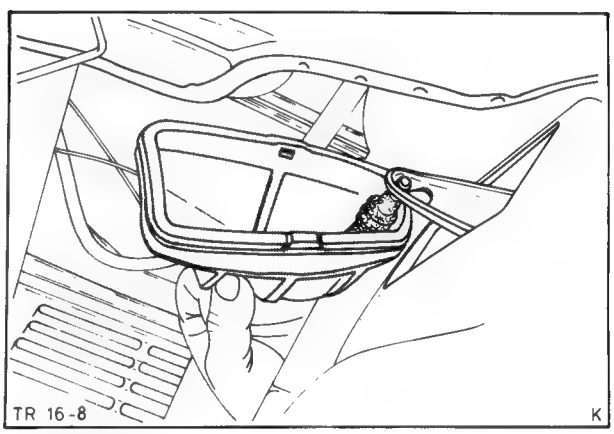


Fig. 142. Disconnect clutch cable from release lever

To Install

5. Insert complete clutch cable.
6. Pass clutch cable through guide in clutch housing and fit rubber gaiter. Draw cable out of cover and connect to clutch release lever. Then insert rubber gaiter in clutch housing.
7. Secure top end of clutch cable in cable yoke with retaining pin.
8. Fit rubber cable seal in bulkhead panel. Adjust clutch play as specified, Fig. 143.

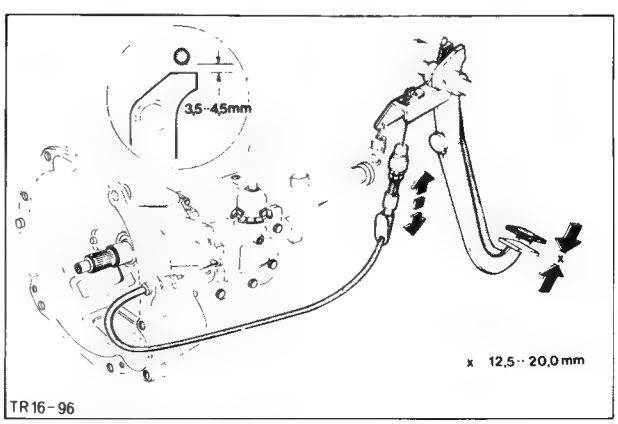


Fig. 143. Clutch play adjustment

TECHNICAL DATA

Gearbox

	'F' gearbox			'G' gearbox
	Standard	Uprated		
Axial play – countershaft gear train	0,15 to 0,46			0,18 to 0,53
Countershaft diameter	17,38 to 17,3673	19,301 to 19,314		19,329 to 19,342
Ratios – 1st gear	3,96:1	3,98:1	3,65:1	4,41:1
2nd gear	2,28:1	2,327:1	1,97:1	2,35:1
3rd gear	1,41:1	1,42:1	1,37:1	1,51:1
4th gear	1,00:1	1,00:1	1,00:1	1,00:1
reverse gear	4,238:1	3,99:1	3,66:1	4,67:1
Oil specification	SQM-2C9008-A			
Oil capacity	1,45 l			1,985 l

Clutch	STD	HD	STD	HD	STD	HD	100L
Manufacturer	Laycock	Fichteal Sachs	Laycock L.U.K. Fichtel Sachs	Automotive Products Fichtel Sachs	Automotive Products Fichtel Sachs	Automotive Products	Automotive Products
Engine	1,6 Ltr Kent		1,6 Ltr and 2,0 Ltr (OHC)		2, Ltr Diesel		
Type	Single-plate dry clutch						
Clutch Size	8½"	9"	8½"	9½"	9½"	10½"	9½"
Lining Material	Ferodo 2124F	Porner 11046 (UK) 846 (EUR)	Ferodo 2124 F	Mintex H 26/1	DON DSW8 (UK) Small+ Parkes	Minex H 26/1	Ferodo 2124 F
Operated by	Cable						
Outer Lining Diameter	216	228	216	242	242	267	242
Inner Lining Diameter	146	150	153	156	162	172	156
Clamped Thickness	7,25	9,3	8,40	8,40	8,40	8,52	8,40
Number of Torsion Springs	5	6	6	6	6	6	6
Diaphragm Spring Pressure	5120 (512)	4880 (488)	4410 (441)	4930 (493)	4930 (493)	5780 (578)	4930 (493)

TIGHTENING TORQUES Nm (kpm)

	'F' gearbox		'G' gearbox	
	Nm	(kpm)	Nm	(kpm)
Clutch housing to gearbox casing	55 to 65	(5,5 to 6,5)	55 to 65	(5,50 to 6,50)
Pressure plate to flywheel	16 to 20	(1,6 to 2,0)	16 to 20	(1,60 to 2,00)
Main drive gear bearing retainer to gearbox casing	21 to 25	(2,1 to 2,5)	16,5 to 20,5	(1,65 to 2,05)
Nut – gearbox mainshaft			35,0 to 41,0	(3,50 to 4,10)
Extension housing to gearbox casing	45 to 49	(4,5 to 4,9)	55,0 to 62,0	(5,50 to 6,20)
Selector housing to gearbox casing	21 to 25	(2,1 to 2,5)	16,5 to 20,5	(1,65 to 2,05)

	Nm	(kpm)
Transmission to cross member insulator	70 to 90	(7,0 to 9,0)
Transmission cross member to body	40 to 50	(4,0 to 5,0)
Driveshaft bearing to support member	20 to 25	(2,0 to 2,5)
Driveshaft flange to differential	60 to 65	(6,0 to 6,5)

Engine	Gearbox				Ratios				Vehicle version
					Rear axle				
	man	auto	STD	RPO	G	F	H man	H auto	
1,6 ltr Kent (OHV)	X		X			4,63	4,56		FT80 van and kombi
				X		5,14	5,14		
1,6 ltr LC (OHC)	X		X			5,14	5,14		FT100, 120 van and kombi 9 and 12–seater bus
				X		4,63	4,56		FT100, 120 platform/chassis+ single cab FT100, 120 platform/chassis + dual cab
2,0 ltr LC (OHC)			X		4,63		4,11		FT100*, 120*† van and kombi
				X	5,14		4,44		FT100L–190 van and kombi
				X	5,83		4,56	4,44	FT130B kombi 9 and 12–s bus*†; 15–s bus
				X			5,14	4,44 HD	FT100*, 120*† platform/chassis+ single cab FT100L–190 platform/chassis+ single cab FT100*, 120*† platform/chassis+ dual cab FT130, 190 platform/chassis+ dual cab
2,4 ltr Diesel (OHV)	X				5,83		4,11		FT100, 120 van and kombi FT100L–190 van and kombi 9 and 12–s bus; 15–s bus FT100, 120 platform/chassis+ single cab FT100L–190 platform/chassis+ single cab FT100, 120 platform/chassis+ dual cab FT130, 190 platform/chassis+ dual cab
		X					4,44		
				X	4,63				
				X	5.14				

Ratio R.axle	Tyre size				Speedo Teeth	
	165 x14	185 x14	195 x14	205 x14	Worm	Gear
4,11:1	G				6	21
	GB	G			6	20
		GB	GB/G	GB/G	6	19
4,44:1	GB	G			6	22
		GB	GB/G	G	6	21
				GB	6	20
	G				5	19
4,63:1			G	G	6	22
	G				5	20
	GB	GB/G	GB	GB	5	19
5,14:1	G				5	22
	GB	G			5	21
		GB	GB/G	G	5	20
				GB	5	19
5,83:1	G				4	20
	GB	GB/G	GB	GB	4	19
			G	G	4	18

*Automatic transmission optional

†Uprated H rear axle with 4,44 HD ratio in conjunction with 2,0 ltr LC (OHC) engine and automatic transmission

MANUAL TRANSMISSION AND CLUTCH (Overdrive) 16B

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Service and Repair Operations	11
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GENERAL DESCRIPTION

As optional equipment, an overdrive unit is available on Transits fitted with the 2,0 litre petrol, 2,4 litre diesel and 3,0 litre petrol engines from the start of 1980 model year, Fig.1.

The overdrive unit is fitted on the rear of the manual gearbox, in place of the normal tailshaft housing. It contains a planetary gear train which connects the input and output shafts to one another. Depending on whether the planetary gear train is disengaged or engaged, the speed of the output shaft is changed from 1 : 1 to 0,778 : 1.

The unit is operated electrically. A sliding switch in the gearshift lever knob switches electrical current on ("IN") or off ("OUT"), correspondingly a solenoid valve opens or closes the hydraulic circuit in the overdrive unit.

Spring pressure or the hydraulic pressure acts on a clutch to hold the planetary gear train in place (1 : 1, direct drive) or to allow it to rotate freely (0,778 : 1, overdrive).

The hydraulic pressure in the overdrive unit is produced by its own plunger type pump. In order that the overdrive can only be engaged in 3rd or top gear, inhibitor switches are fitted to the shift rods of 1st, 2nd and reverse gears of the 4-speed gearbox, which then break the electrical circuit, to prevent incorrect engaging of overdrive.

The overdrive can be engaged or disengaged at any speed, but should usually only be engaged at speeds of over 50 km/h (30 miles/h) (driving in 3rd and top gear) as road and driving conditions permit. When driving at high road speeds, especially in 3rd gear, the overdrive should not be disengaged because this causes excessive engine revolutions.

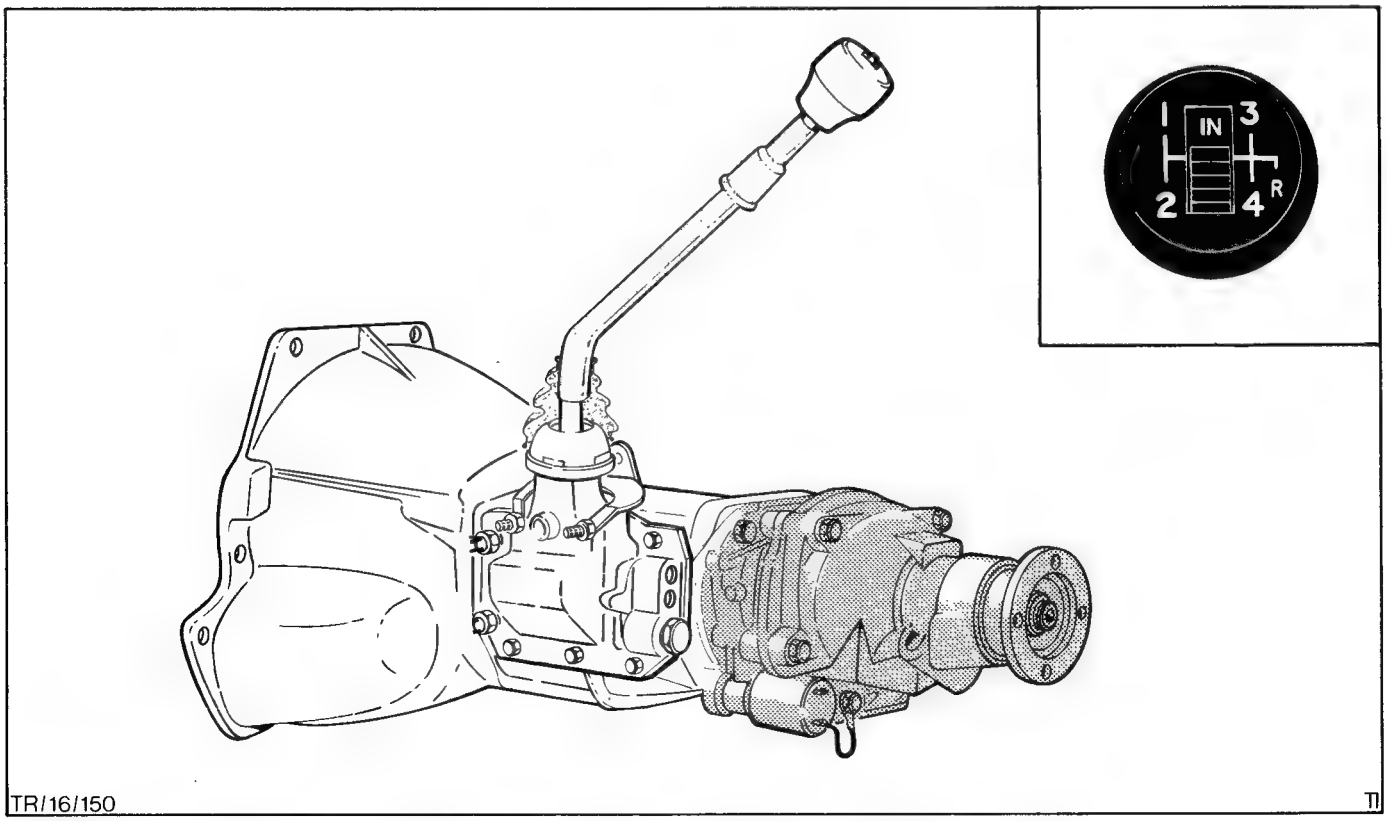


Fig.1. Manual gearbox with overdrive unit fitted - inset shows operating switch.

PRINCIPLE OF OPERATION

Power flow in the overdrive ("OUT" position), Fig.2A

In direct drive, input and output shafts are connected with one another so that they turn together. The cone clutch is locked in contact to the output annulus (ring gear). The uni-directional clutch is meshed.

Power flow in the overdrive ("IN" position), Fig.2B

As soon as the overdrive is engaged, the frictional connection (cone clutch - output annulus) is loosened by means of hydraulic pressure, and the cone clutch is pressed against the fixed brake ring. Cone clutch and sunwheel are held stationery; the planet carrier rotates with the input shaft at the same speed. The planet wheels roll off the sunwheel and drive the ring gear at their speed. The output shaft now turns at a faster speed than the input shaft, and the uni-directional clutch is over-run. At the same vehicle speed, the engine will run more slowly and efficiently, reducing fuel consumption and engine noise.

The oil pump and control unit are part of the hydraulic system of the overdrive unit and are described separately.

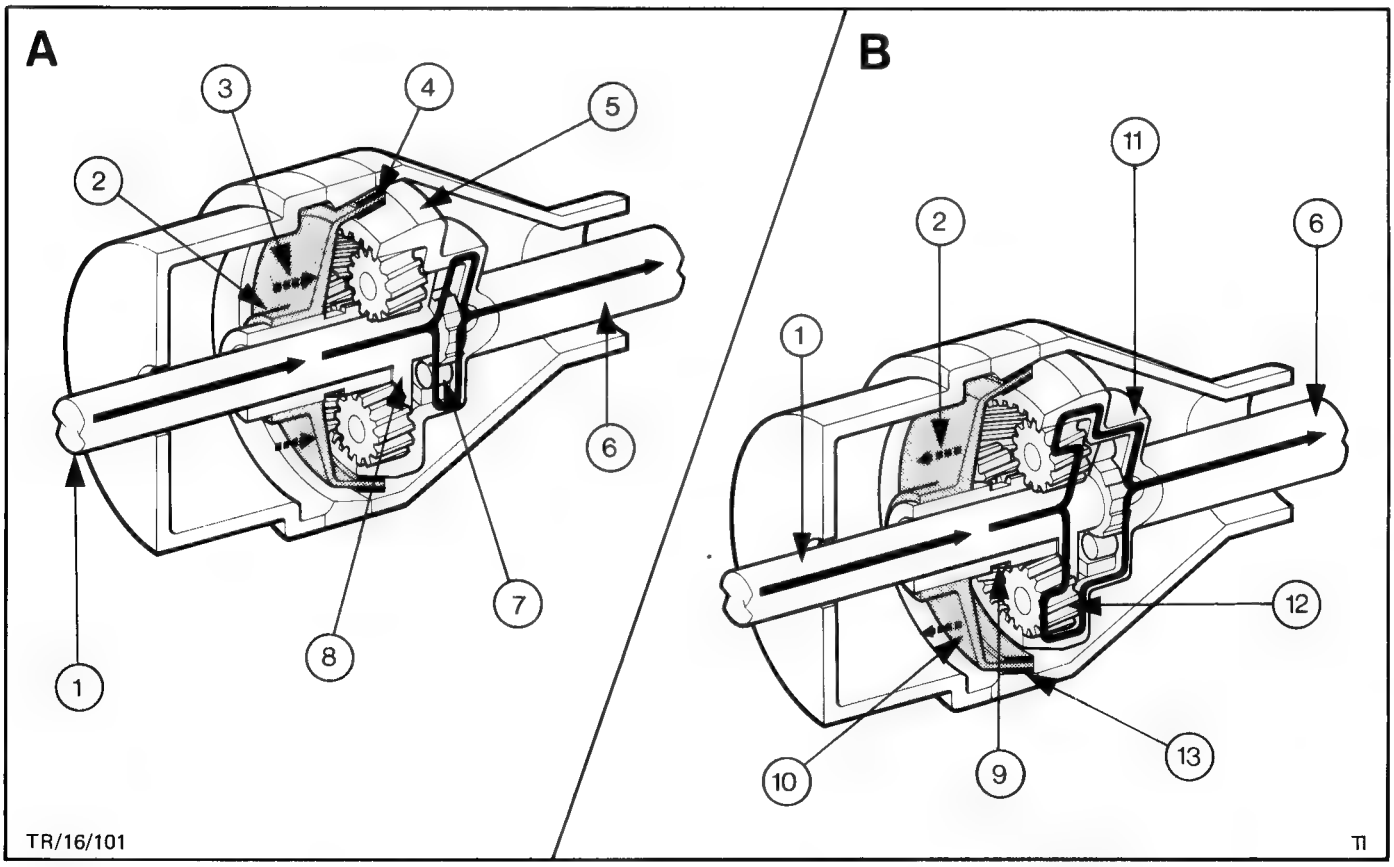


Fig.2. A - POWER FLOW IN "OUT" POSITION
1 - Input shaft
2 - Cone clutch (sliding)
3 - Spring pressure
4 - Annulus and sunwheel locked
5 - Output annulus (ring gear)
6 - Output shaft
7 - Uni-directional clutch (clamping rollers)
8 - Planet carrier
9 - Sunwheel
10 - Hydraulic pressure

B - POWER FLOW IN "IN" POSITION
11 - Output annulus (ring gear
12 - Planet wheel
13 - Locked cone clutch holds sunwheel stationary.

PRINCIPLE OF OPERATION (cont'd)

Hydraulic system

The plunger-type oil pump in the overdrive is operated via a cam on the input shaft. The pump draws oil from the oil sump through a suction filter and delivers this oil via a non-return ball valve through a pressure filter to the operating pistons, solenoid valve and relief valve.

In the relief valve, there is also an integrated spring dashpot which, by giving a progressive load application between the cone clutch and brake ring, ensures a smooth engagement and disengagement of the cone clutch under varying driving conditions.

In direct drive, a residual hydraulic pressure of approximately 1,5 - 3,0 Bar is maintained within the system. When overdrive is engaged, this pressure is increased to an operating pressure of approximately 36 - 38,5 Bar.

Hydraulic system with overdrive engaged, Fig.4

The overdrive switch (in the gearshift-lever knob) operated by the driver causes the solenoid switch to open the control valve.

The hydraulic pressure moves the operating pistons forward, overcoming the spring pressure of the cone clutch, and the cone clutch is pressed into the conical brake ring.

For purposes of self-lubrication, the oil then flows to the input shaft, flows through it to the rear bearing in the annulus and is then distributed for the purpose of lubricating the moving parts and planet wheels before it finally returns into the oil sump.

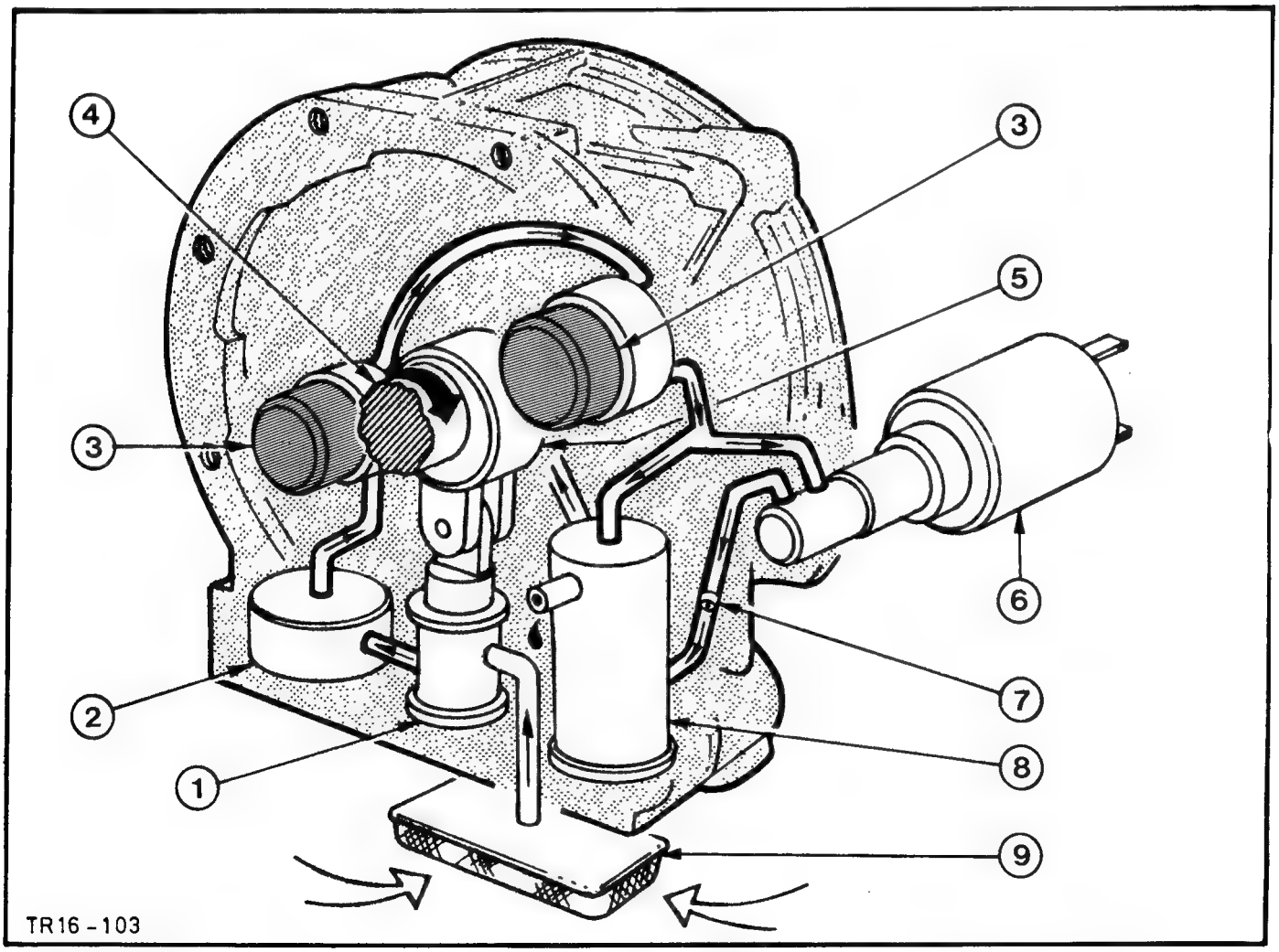


Fig.4. Hydraulic circuit with overdrive engaged.

1 - Oil pump
2 - Hydraulic pressure filter
3 - Operating pistons
4 - Input shaft
5 - Oil pump cam
6 - Solenoid valve
7 - Restrictor passage
8 - Hydraulic control
9 - Oil sump with suction filter

PRINCIPLE OF OPERATION

Hydraulic oil pressure system with overdrive disengaged

After the overdrive switch is brought into the "OUT" position, the control valve is closed by the solenoid valve, cutting off the oil supply from the pump to the dashpot piston.

By this means, oil is exhausted from the dashpot by way of the exhaust port, the spring in the relief valve is relaxed, and the valve returns to its direct drive position. Simultaneously, the springs of the dashpot valve move the dashpot piston until it reaches its stop.

The operating pressure can now be progressively reduced, and the cone clutch is gently brought into contact with the output annulus (ring gear) by the clutch return springs.

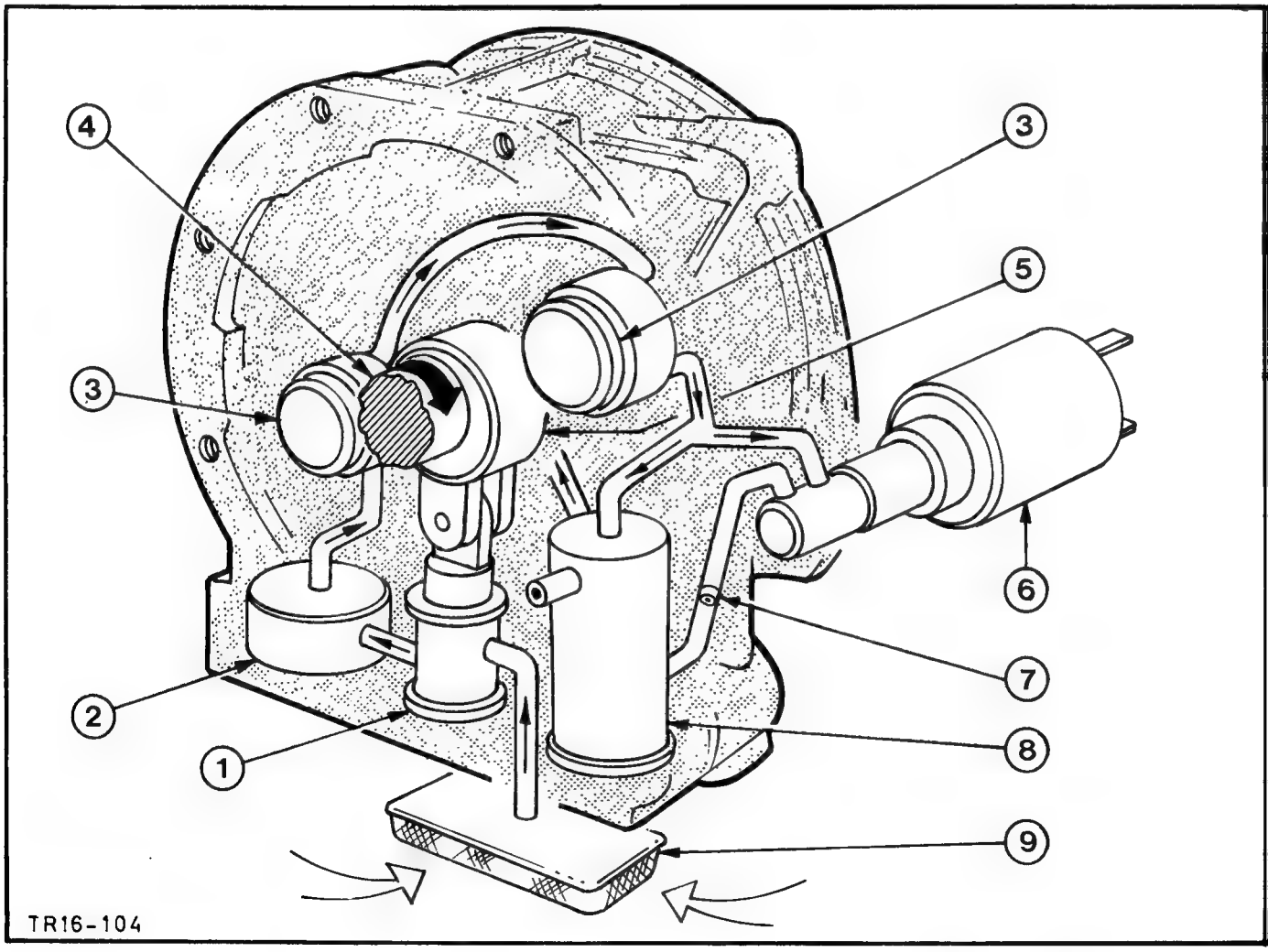


Fig.5. Hydraulic circuit with overdrive disengaged.

1 - Oil pump
2 - Hydraulic pressure filter
3 - Operating pistons
4 - Input shaft
5 - Oil pump cam
6 - Solenoid valve
7 - Restrictor passage
8 - Hydraulic control
9 - Oil sump with suction filter

ELECTRICAL CONTROL SYSTEM, Fig.6.

When the control switch in the gearshift-lever knob is put into the "IN" position, the solenoid valve receives electrical current via the two inhibitor switches in the gearshift cover.

The electrical circuit is broken by the inhibitor switches in 1st, 2nd and reverse gears.

FAULT FINDING

Disconnect the terminal of the power cable from the solenoid. Connect a test lamp between this cable and earth. Engage top gear, and put overdrive control switch (with ignition on) into "IN" position. The test lamp should now light.

If this is not the case, trace the fault in the electrical system, e.g. at the fuse, in the wiring, at the solenoid or inhibitor switches. If the test lamp does not go out with 1st, 2nd or reverse gear engaged, the operation of the inhibitor switches must be checked.

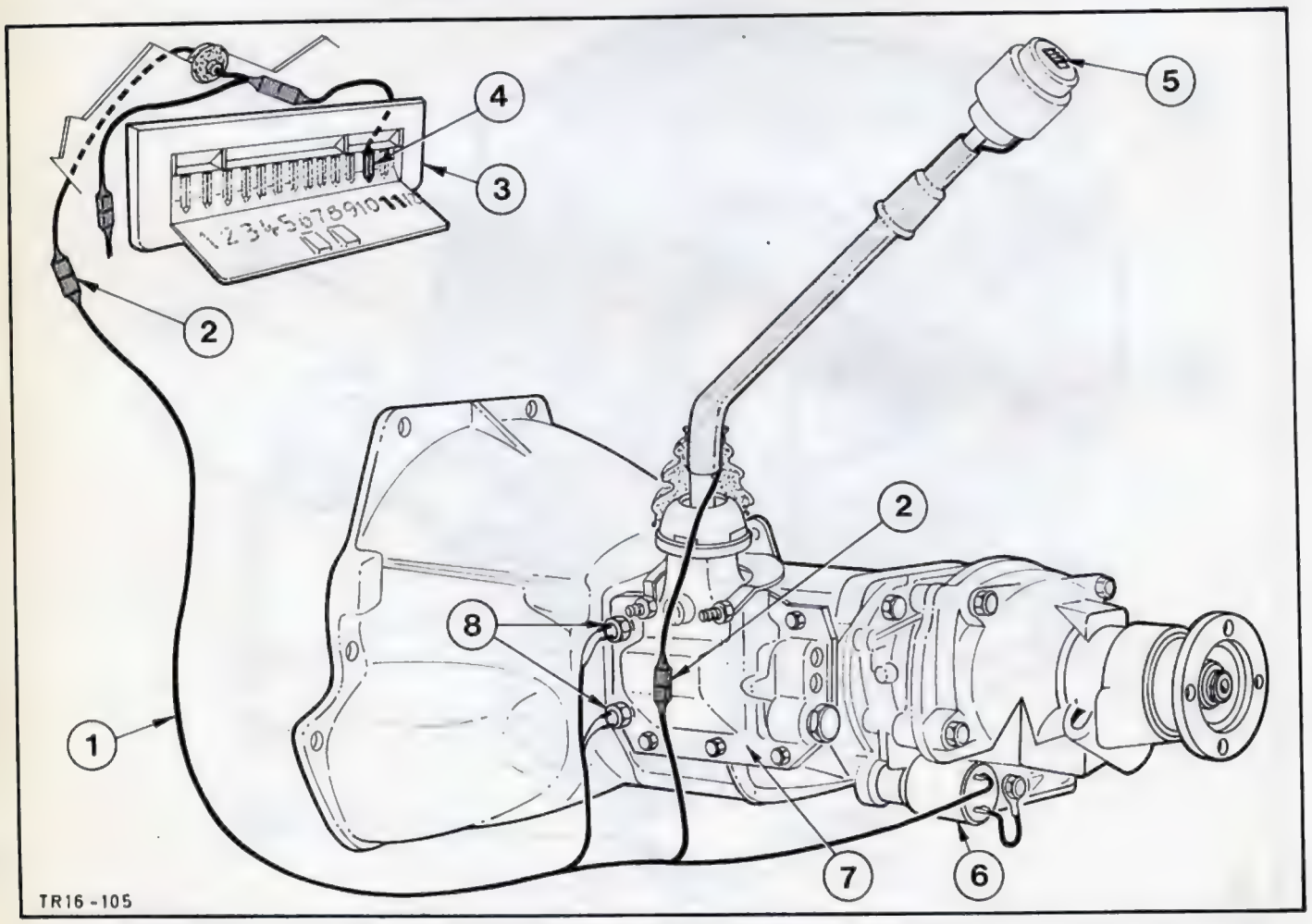


Fig.6. Electrical connections in conjunction with overdrive unit.

1 - Wiring loom
2 - Plug and socket connection
3 - Fuse box
4 - Fuse No.11
5 - Operating switch
6 - Solenoid
7 - Gearshift cover
8 - Gear inhibitor switch (2)

FAULT FINDING (cont'd)

Overdrive does not engage

1. Too little oil in gearbox.
2. Fault in electrical circuit.
3. Insufficient pump pressure as a result of bad sealing off of pump non-return valve ball (probably dirty valve seat).
4. Insufficient pump pressure as a result of a blockage in the relief valve or a sticking piston.
5. Pump does not work because of filter blockage.
6. Damaged parts in the overdrive.
7. Blocked restrictor passage.
8. Faulty solenoid valve.

Overdrive does not disengage

Caution: If the overdrive does not disengage, be sure not to reverse the vehicle, otherwise extensive damage may be caused.

1. Fault in electrical circuit.
2. Cone clutch is sticking.
   This problem can occur with a new overdrive because the cone clutch has not yet been run in adequately. The clutch can usually be loosened with several blows (with a non-metallic hammer) on the brake ring.
3. Damaged parts in the overdrive.
4. Seized dashpot/relief valve.
5. Restrictor passage blocked.
6. Faulty solenoid valve.

Overdrive slips when engaging

1. Too little oil in the gearbox.
2. Insufficient pump pressure as a result of bad sealing off of the pump non-return valve ball (probably dirty valve seat).
3. Insufficient pump pressure as a result of bad sealing of the relief valve.
4. Partially blocked filters.
5. Clutch lining worn or glazed.
6. Faulty solenoid valve.

Overdrive disengagement slow and/or no engine braking effect in over-run

1. Blockage in restrictor passage.
2. Dashpot/relief valve sticking.
3. Faulty solenoid valve.

Overdrive slips/no drive in reverse

1. Seized dashpot/relief valve piston. -
2. Restrictor valve partially blocked. -) - High residual pressure
3. Solenoid control valve faulty. -
4. Sunwheel circlip adrift.
5. Glazed/worn cone clutch lining.

SERVICE ADJUSTMENTS AND CHECKS

Lubrication

Gearbox and overdrive unit have a common oil supply (see Technical Data). The oil level may be checked by means of the plug on the gearbox, fill to the bottom of the plug hole.

The overdrive unit is equipped with pressure lubrication, whereby the oil from the relief valve flows through drillings to an annular channel in the front casing section, from there it flows through the centre drilling of the input shaft to the rear bearing in the ring gear. From here it is directed by an oil thrower onto a catcher disc in the planet carrier to the planet bearings via the hollow planet bearing pins.

Following complete draining and refilling, the oil level must be checked again after a short trial run. It is essential that only prescribed oil be used for topping up or for an oil change.

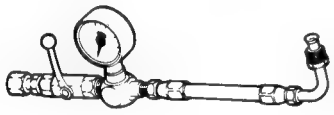
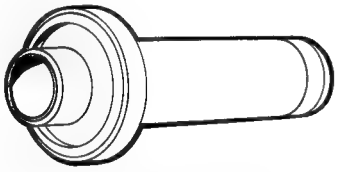
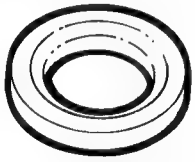
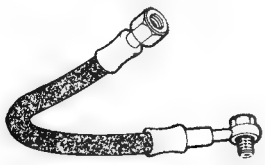
ON NO ACCOUNT SHOULD ANY ANTI-FRICTION ADDITIVES BE USED

Since the gearbox and the overdrive have a common oil supply, scrupulous cleanliness must be maintained throughout all servicing operations.

For cleaning externally or internally, use only petrol or paraffin, since otherwise damage may occur to oil seals and other parts of the unit.

On no account should water be used during cleaning operations because this would also affect the operation of the overdrive.

SPECIAL SERVICE TOOLS

	13-007	Hydraulic test equipment
	15-010 A	Installation mandrel with spacer ring
	21-063	Sealing ring - rear overdrive housing
	16-030	Pressure take-off adaptor
	21-096	Extractor, sealing ring - overdrive housing rear

SERVICE AND REPAIR OPERATIONS - CONTENTS

MANUAL TRANSMISSION AND CLUTCH		Described in this publication	Contained in operation
16 401	Overdrive assembly - check (includes top up oil level and pressure check)	X	-
16 404	Overdrive assembly - remove and install	X	-
16 408	Seal - overdrive rear housing - replace	-	16 164 (see Section 16)
33 562	Switch - overdrive control - remove and install	X	-
33 563	Switch - inhibitor - overdrive - remove and install	X	-
33 755	Solenoid - overdrive - remove and install	X	-

SERVICE AND REPAIR OPERATIONS

16 401 OVERDRIVE ASSEMBLY - CHECK (includes top up oil level and pressure check)

SPECIAL SERVICE TOOLS REQUIRED:

Hydraulic test equipment	13-007
Pressure take off adaptor	16-030

1. Before checking the oil pressure, check for current flow at the solenoid valve using a test lamp, with 3rd or top gear engaged.

2. After first ensuring that the oil level is correct, remove the screw plug, Fig.7, and then connect the hydraulic test equipment 13-007 with the adaptor 16-030, Fig.8.

3. Jack up the rear of the vehicle and fit stands, then measure the overdrive oil pressure as follows:

   Run the transmission in top gear at approximately 40 km/h (25 miles/h) which should show a residual oil pressure of approximately 1,7 Bar on the pressure gauge. When overdrive is engaged, the oil pressure should rise to approximately 36 - 38,5 Bar. With the overdrive disengaged, the pressure gauge should return to the residual oil pressure.

   If the prescribed oil pressure is not reached, this points to a fault in the hydraulic system.

4. Refit screw plug with new sealing ring.

5. Jack up, remove stands and lower rear of vehicle. Remove hydraulic test equipment and adaptor.

6. Check oil level - if necessary top up with specified oil.

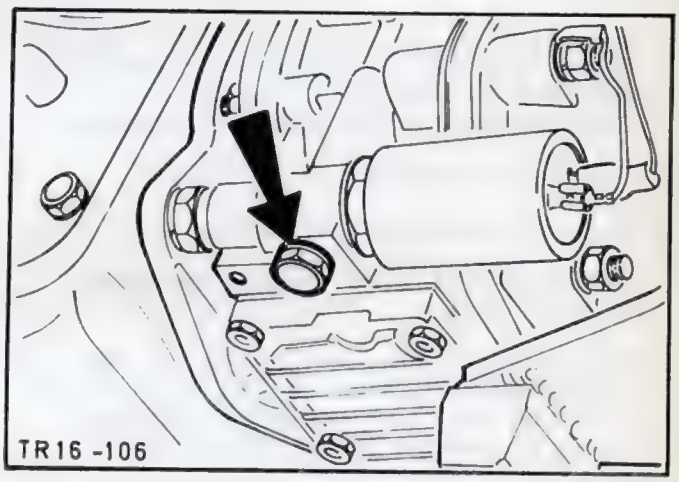


Fig.7. Screw plug for oil pressure check.

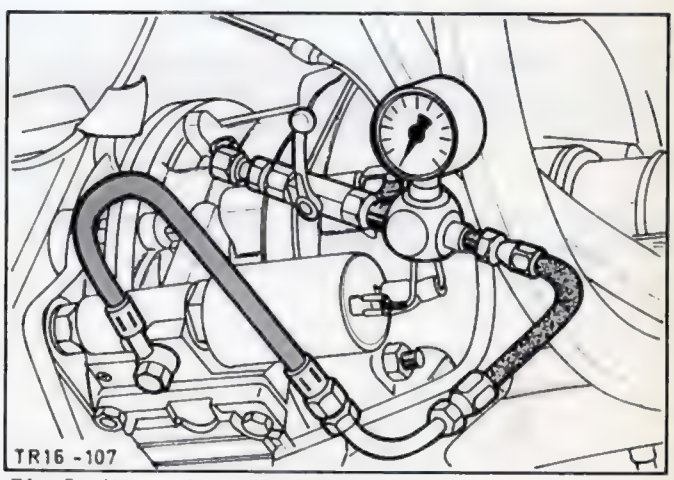


Fig.8. Measuring oil pressure.

16 404 OVERDRIVE ASSEMBLY - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

NOTE: Before removing the overdrive unit, the vehicle should be driven with overdrive engaged. Then disengage overdrive with the clutch depressed. This is the starting position for the removal of the overdrive unit. This releases the spline loading between planet carrier and uni-directional clutch which could make removal difficult. This measure is only possible when the overdrive unit can still be engaged. Otherwise it may be necessary to proceed as described under Item 8.

1. Disconnect earth lead from the battery.
2. Drain gearbox/overdrive oil.
3. Separate driveshaft from overdrive flange (4 bolts).
4. Remove gearbox crossmember (4 bolts). Support gearbox with jack, disconnect crossmember from overdrive and body, Fig.9, thereby disconnecting one side complete with holder.
5. Disconnect speedometer cable (1 bolt).
6. Disconnect solenoid-valve wiring.
7. Remove nuts (8) at the front of the adaptor plate, Fig.10A.
8. Before removing the overdrive unit at the gearbox adaptor plate, the rear nuts (6), for releasing the spline loading, if necessary, should be loosened flush on the overdrive casing, Fig.10B.

NOTE: This is only necessary if the spline loading has not previously been released (see introduction).

9. First loosen overdrive from the adaptor plate with a non-metallic hammer, then lift complete overdrive unit out, Fig.11.
10. Remove gearbox crossmember bracket from the overdrive unit (4 bolts).

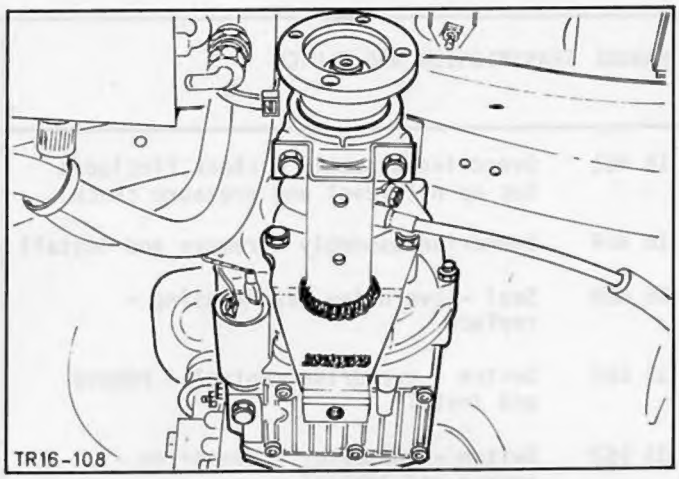


Fig.9. Gearbox crossmember dismantled.

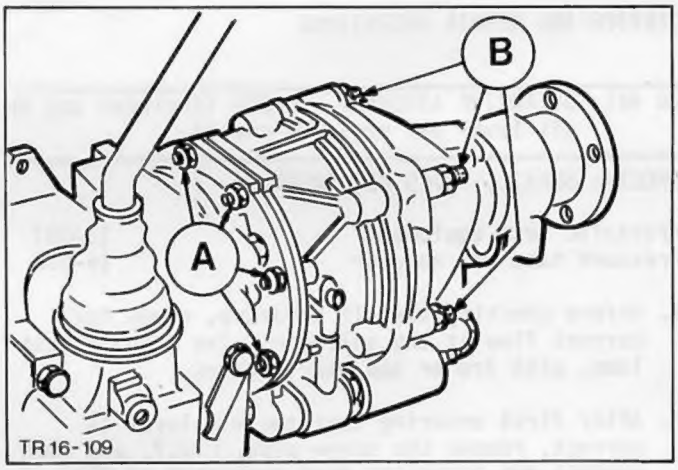


Fig.10. A - Nuts securing overdrive to adaptor plate
B - Nuts securing rear overdrive casing

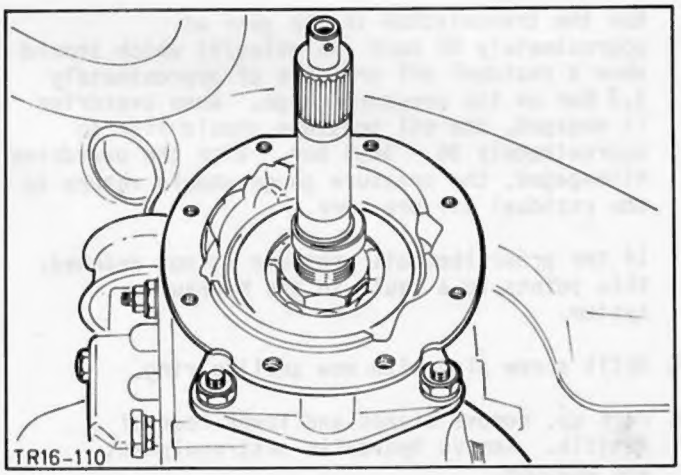


Fig.11. Gearbox with overdrive removed.

To Refit

11. Refit gearbox crossmember bracket to overdrive.

12. Fit overdrive with new gasket (do not use jointing compound), Fig.12. First align splines by turning (in a clockwise direction) the output shaft while pressing the overdrive against the gearbox until the splines become engaged. Fit and tighten the nuts (8) securing the overdrive to the adaptor plate.

NOTE: If the overdrive fails to meet the adaptor plate face by approximately 16 mm, this means that the splines of the uni-directional clutch have become misaligned. In this case, remove the overdrive unit, and re-align the splines.

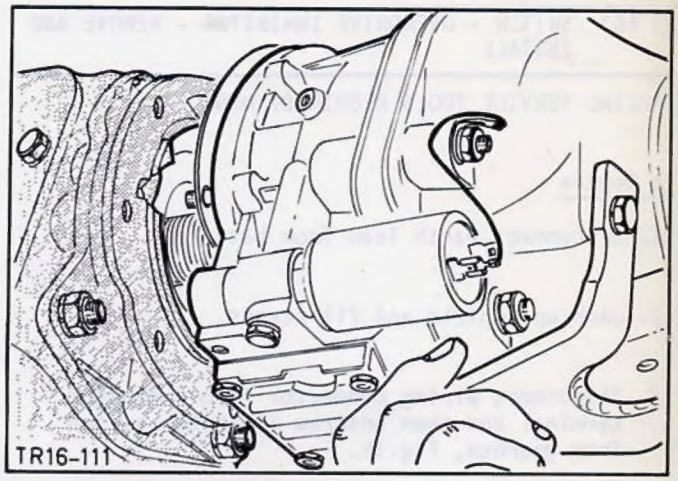


Fig.12. Refitting overdrive unit.

13. Connect solenoid wiring.

14. Refit speedometer cable.

15. Refit gearbox crossmember to body and overdrive unit, Fig.13.

16. Refit driveshaft to overdrive rear flange, (use new bolts and nuts).

17. Fill transmission with specified oil. (See Technical Data).

18. Refit earth lead to battery.

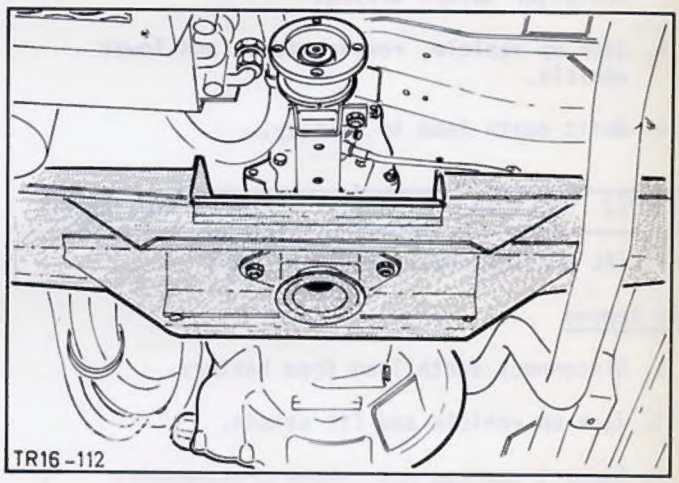


Fig.13. Refitting gearbox crossmember.

33 562 SWITCH - OVERDRIVE CONTROL - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Disconnect earth lead from battery.

2. Remove gear lever knob, Fig.14. and disconnect wiring from overdrive control switch.

3. Unscrew overdrive control switch from gear lever knob.

To Install

4. Screw overdrive control switch to gear lever knob.

5. Connect wiring to overdrive control switch and replace gear lever knob.

6. Refit earth lead to battery.

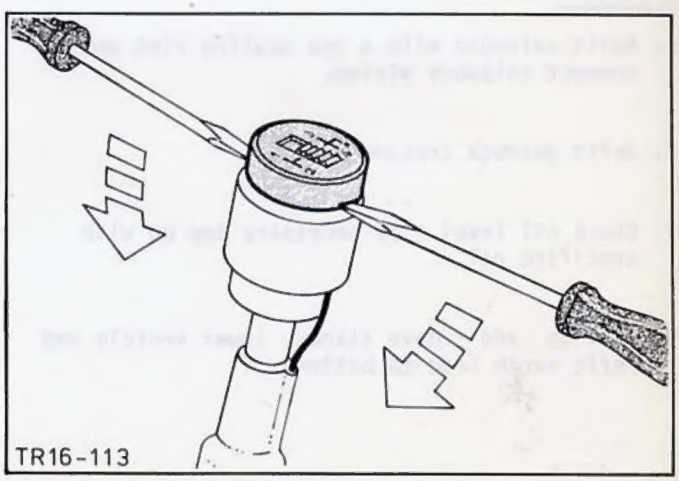


Fig.14. Remove gear lever knob.

33 563

33 563 SWITCH - OVERDRIVE INHIBITOR - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Disconnect earth lead from battery.
2. Jack up vehicle and fit stands.
3. Disconnect wiring connector from inhibitor terminal and then unscrew inhibitor switch from gearbox, Fig.15.

To Install

4. Fit new sealing ring to inhibitor switch, refit inhibitor switch to gearbox. Connect inhibitor switch wiring.
5. Jack up vehicle, remove stands and lower vehicle.
6. Refit earth lead to battery.

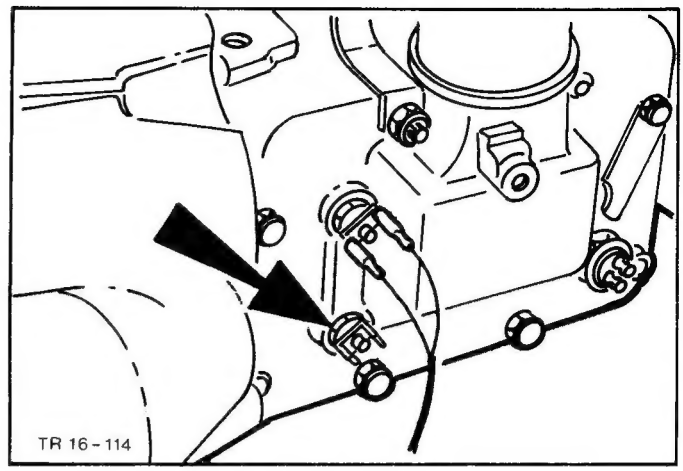


Fig.15. Remove inhibitor switch.

33 752 SOLENOID - OVERDRIVE - REMOVE AND INSTALL

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Disconnect earth lead from battery.
2. Jack up vehicle and fit stands.
3. Support gearbox and remove crossmember.
4. Disconnect solenoid wiring and remove solenoid, Fig.16.

To Install

5. Refit solenoid with a new sealing ring and connect solenoid wiring.
6. Refit gearbox crossmember.
7. Check oil level - if necessary top up with specified oil.
8. Jack up and remove stands, lower vehicle and refit earth lead to battery.

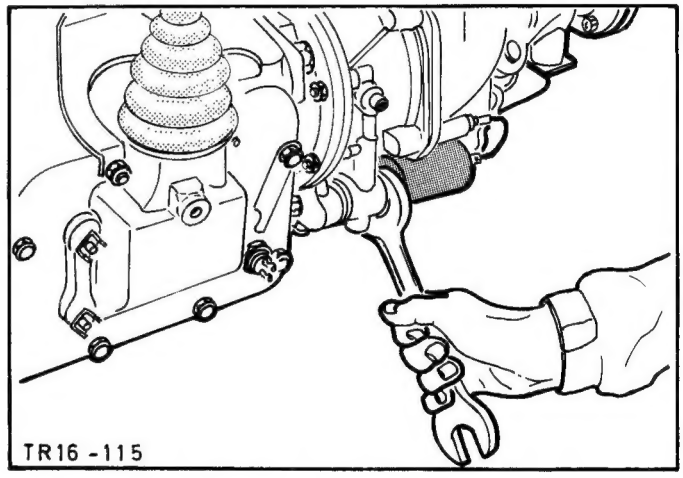


Fig.16. Remove solenoid.

TECHNICAL DATA

Manufacturer	Laycock
Model	I 28
Overall transmission ratio	0,778 : 1
Oil pressure with overdrive disengaged ..	1,5 to 3,0 Bar
Oil pressure with overdrive engaged	36 to 38,5 Bar
Oil specification	SQM-2C 9008-A
Oil quantity (gearbox with overdrive) ..	3,1 litres

Tightening torques	Nm	kgf.m	lbf.ft
Stud - gearbox to adaptor..	33 to 40	3,3 to 4,0	23,1 to 28
Nut - gearbox to adaptor	50 to 62	5,0 to 6,2	35 to 43,4
Stud - adaptor to overdrive housing	3,6 to 4,3	0,36 to 0,43	2,5 to 3
Nut - adaptor to overdrive housing	7,1 to 11,4	0,71 to 1,14	5 to 8
Nut - extension to overdrive housing	13 to 18,5	1,3 to 1,85	9 to 13
Screw plug - Oil pressure test	13 to 21,5	1,3 to 2,15	9 to 15
Bolt - Mounting bracket to overdrive	38 to 48	3,8 to 4,8	26,6 to 33,6
Bolt - Mounting bracket to body crossmember..	70 to 90	7,0 to 9,0	49 to 63
Bolt - Crossmember to body bracket	40,5 to 51	4,05 to 5,1	28 to 36